



*Zootaxa* 3287: 1–262 (2012)

[www.mapress.com/zootaxa/](http://www.mapress.com/zootaxa/)

Copyright © 2012 · Magnolia Press

**Monograph**

ISSN 1175-5326 (print edition)

**ZOOTAXA**

ISSN 1175-5334 (online edition)

# ZOOTAXA

3287

## **A review of the genera of Australian cicadas (Hemiptera: Cicadoidea)**

**M. S. MOULDS**

*Entomology Dept, Australian Museum, 6 College Street, Sydney N.S.W. 2010*

*E-mail: [msmoulds@gmail.com](mailto:msmoulds@gmail.com)*



Magnolia Press  
Auckland, New Zealand

*Accepted by J.P. Duffels: 31 Jan. 2012; published: 30 Apr. 2012*

M. S. MOULDS

**A review of the genera of Australian cicadas (Hemiptera: Cicadoidea)**

(*Zootaxa* 3287)

262 pp.; 30 cm.

30 Apr. 2012

ISBN 978-1-86977-889-7 (paperback)

ISBN 978-1-86977-890-3 (Online edition)

FIRST PUBLISHED IN 2012 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: [zootaxa@mapress.com](mailto:zootaxa@mapress.com)

<http://www.mapress.com/zootaxa/>

© 2012 Magnolia Press

All rights reserved.

No part of this publication may be reproduced, stored, transmitted or disseminated, in any form, or by any means, without prior written permission from the publisher, to whom all requests to reproduce copyright material should be directed in writing.

This authorization does not extend to any other kind of copying, by any means, in any form, and for any purpose other than private research use.

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

## TABLE OF CONTENTS

Abstract .....	5
Introduction .....	5
Historical review .....	6
Terminology .....	7
Materials and methods .....	13
Justification for new genera .....	14
Summary of classification for Australian Cicadoidea .....	21
Key to tribes of Australian Cicadinae .....	25
Key to the tribes of Australian Cicadettinae .....	26
Key to genera of Australian Cicadoidea .....	26
Generic reviews and diagnoses .....	46
Genus <i>Abricta</i> Stål .....	46
Genus <i>Adelia</i> gen. n. ....	46
Genus <i>Aleeta</i> Moulds .....	49
Genus <i>Anapsaltoda</i> Ashton .....	51
Genus <i>Arenopsaltria</i> Ashton .....	53
Genus <i>Arunta</i> Distant .....	55
Genus <i>Auscala</i> gen. n. ....	57
Genus <i>Baeturia</i> Stål .....	59
Genus <i>Birrima</i> Distant .....	59
Genus <i>Burbunga</i> Distant .....	62
Genus <i>Caliginopsalta</i> Ewart .....	64
Genus <i>Chelapsalta</i> gen. n. ....	67
Genus <i>Chlorocysta</i> Westwood .....	69
Genus <i>Chrysocicada</i> Boulard .....	71
Genus <i>Cicadetta</i> Kolenati .....	73
Genus <i>Clinata</i> gen. n. ....	76
Genus <i>Clinopsalta</i> gen. n. ....	78
Genus <i>Crotopsalta</i> Ewart .....	80
Genus <i>Cyclochila</i> Amyot and Serville .....	83
Genus <i>Cystopsaltria</i> Goding and Froggatt .....	84
Genus <i>Cystosoma</i> Westwood .....	86
Genus <i>Diceropyga</i> Stål .....	90
Genus <i>Diemeniana</i> Distant .....	92
Genus <i>Dipsopsalta</i> gen. n. ....	95
Genus <i>Drymopsalta</i> Ewart .....	98
Genus <i>Erempsalta</i> gen. n. ....	100
Genus <i>Ewartia</i> gen. n. ....	103
Genus <i>Froggattoides</i> Distant .....	105
Genus <i>Gagatopsalta</i> Ewart .....	108
Genus <i>Galanga</i> gen. n. ....	110
Genus <i>Gelidea</i> gen. n. ....	112
Genus <i>Glaucopsaltria</i> Goding and Froggatt .....	115
Genus <i>Graminitrigrina</i> Ewart and Marques .....	117
Genus <i>Gudanga</i> Distant .....	119
Genus <i>Guineapsaltria</i> de Boer .....	121
Genus <i>Gymnotympana</i> Stål .....	123
Genus <i>Heliopsalta</i> gen. n. ....	126
Genus <i>Henicopsaltria</i> Stål .....	128
Genus <i>Illyria</i> Moulds .....	130
Genus <i>Jassopsaltria</i> Ashton .....	133
Genus <i>Kikihia</i> Dugdale .....	135
Genus <i>Kobonga</i> Distant .....	137
Genus <i>Lembeja</i> Distant .....	139

Genus <i>Limnopsalta</i> gen. n. . . . .	141
Genus <i>Macrotristria</i> Stål . . . . .	144
Genus <i>Marteena</i> Moulds. . . . .	146
Genus <i>Melampsalta</i> Kolenati . . . . .	148
Genus <i>Mugadina</i> gen. n. . . . .	149
Genus <i>Myopsalta</i> gen. n. . . . .	151
Genus <i>Nanopsalta</i> gen. n. . . . .	154
Genus <i>Neopsaltoda</i> Distant . . . . .	156
Genus <i>Neopunia</i> gen. n. . . . .	158
Genus <i>Noongara</i> gen. n. . . . .	160
Genus <i>Notopsalta</i> Dugdale . . . . .	162
Genus <i>Owra</i> Ashton . . . . .	163
Genus <i>Oxypleura</i> Amyot and Serville . . . . .	165
Genus <i>Palapsalta</i> gen. n. . . . .	167
Genus <i>Paradina</i> gen. n. . . . .	169
Genus <i>Parnkalla</i> Distant . . . . .	172
Genus <i>Parnquila</i> gen. n. . . . .	174
Genus <i>Pauropsalta</i> Goding and Froggatt . . . . .	176
Genus <i>Physeema</i> gen. n. . . . .	179
Genus <i>Pictila</i> gen. n. . . . .	182
Genus <i>Pipilopsalta</i> Ewart . . . . .	184
Genus <i>Platyleura</i> Amyot and Serville . . . . .	186
Genus <i>Platypsalta</i> gen. n. . . . .	186
Genus <i>Plerapsalta</i> gen. n. . . . .	189
Genus <i>Psaltoda</i> Stål . . . . .	192
Genus <i>Punia</i> gen. n. . . . .	195
Genus <i>Pyropsalta</i> gen. n. . . . .	197
Genus <i>Quintilia</i> Stål . . . . .	199
Genus <i>Samaecicada</i> Popple and Emery . . . . .	199
Genus <i>Simona</i> gen. n. . . . .	202
Genus <i>Sylphoides</i> gen. n. . . . .	204
Genus <i>Talcopsaltria</i> Moulds . . . . .	206
Genus <i>Tamasa</i> Distant . . . . .	209
Genus <i>Taurella</i> gen. n. . . . .	211
Genus <i>Telmapsalta</i> gen. n. . . . .	214
Genus <i>Terepsalta</i> gen. n. . . . .	216
Genus <i>Tettigarcta</i> White . . . . .	219
Genus <i>Thaumastopsaltria</i> Kirkaldy . . . . .	222
Genus <i>Thopha</i> Amyot and Serville . . . . .	224
Genus <i>Toxala</i> gen. n. . . . .	226
Genus <i>Tryella</i> Moulds . . . . .	229
Genus <i>Urabunana</i> Distant. . . . .	231
Genus <i>Uradolichos</i> gen. n. . . . .	233
Genus <i>Venustria</i> Goding and Froggatt . . . . .	235
Genus <i>Yoyetta</i> gen. n. . . . .	237
Acknowledgments . . . . .	240
References. . . . .	241
Systematic index . . . . .	255



## ABSTRACT

The identities of all 242 described Australian Cicadoidea species (and their synonyms) have been confirmed, mostly by examination of types, and their generic status reviewed. Male genitalia of all but two Australian species have been examined and those of the type species of each genus are figured. The first key to genera incorporating both males and females is presented along with a brief history of Australian genera. A cladistic analysis incorporating 71 species from the tribe Cicadettini is also presented, the primary purpose of which was to identify generic groupings and their apomorphies.

The following 34 genera are described as new: *Adelia* gen. n., *Auscala* gen. n., *Chelapsalta* gen. n., *Clinopsalta* gen. n., *Clinata* gen. n., *Dipsopsalta* gen. n., *Erempsalta* gen. n., *Ewartia* gen. n., *Galanga* gen. n., *Gelidea* gen. n., *Heliopsalta* gen. n., *Limnopsalta* gen. n., *Mugadina* gen. n., *Myopsalta* gen. n., *Nanopsalta* gen. n., *Neopunia* gen. n., *Noongara* gen. n., *Palapsalta* gen. n., *Paradina* gen. n., *Parnquila* gen. n., *Physeema* gen. n., *Pictila* gen. n., *Platypsalta* gen. n., *Plerapsalta* gen. n., *Punia* gen. n., *Pyropsalta* gen. n., *Simona* gen. n., *Sylphoides* gen. n., *Taurella* gen. n., *Telmopsalta* gen. n., *Terepsalta* gen. n., *Toxala* gen. n., *Uradolichos* gen. n., *Yoyetta* gen. n.

Three genera, *Cicadetta* Kolenati, *Notopsalta* Dugdale, and *Quintilia* Stål, are removed from the fauna of Australia. Twelve species names are placed into junior synonymy and 74 new combinations are established. As a consequence of this review all 81 genera currently recognised as occurring in Australia are redefined using a common suite of characters identified as meaningful at generic level. To these have been added a further 35 characters when describing genera in the tribe Cicadettini in order to differentiate a large number of closely allied genera.

**Key words:** Burbungini, Chlorocystini, Cicadettinae, cicada, Cicadettini, Cicadidae, Cicadinae, Cicadini, Cryptotympanini, Cyclochilini, Jassopsaltriini, Key to cicada genera of Australia, Key to cicada tribes of Australia, Prasiini, Platyleurini, Talcopsaltriini, Tamasini, Taphurini, Tettigarctidae, Thophini, wax secretion

## INTRODUCTION

In an earlier work (Moulds 1990) I reviewed the Australian cicada fauna as then known. While preparing that text it became evident that generic definitions as a whole were inadequate and many species did not fit comfortably within the genera in which they were placed. In particular, many species included within *Cicadetta*, *Pauropsalta* and *Urabunana* (together encompassing nearly half the described Australian fauna at that time) showed obvious incompatibilities. Further, the identities of many described Australian species remained uncertain. These impediments have hindered the construction of a satisfactory key to the Australian genera. The most recent key available is that of Distant (1906d) but it is now outdated and largely unworkable for the Australian fauna.

The primary aim of this study has been to provide a generic overview for the described Australian species. The task of describing the plethora of new Australian species (and any new genera that they may require) is not addressed.

The generic descriptions provided here are intrinsically linked to the cladistic analysis of cicada family groups (Moulds 2005a). The data set of character attributes upon which that cladistic study was based has provided a basis for selecting characters meaningful at generic level for this generic review. Some additional characters uninformative as cladistic attributes but otherwise obvious features, i.e. the distribution of wing infuscations, colour, and the width of the head in relation to the thorax (the last a traditional character featuring often in generic and tribal descriptions) have been added to the descriptions to help characterize genera. Also, autapomorphies have been added. The descriptions treat characters in the same order, thus permitting direct comparisons between genera. Distinguishing features that characterize each genus are summarised after generic diagnoses.

Since the publication of the phylogenetic analysis of Australian genera by Moulds (2005a), six new genera from the tribe Cicadettini have been described (Ewart 2005a, Ewart & Marques 2008, Popple & Emery 2010), plus a new genus in a new monotypic tribe (Moulds 2008b). I now add a further 34 genera, the majority of which fall within the tribe Cicadettini. Many of these are represented by their type species in the phylogeny of Moulds (2005a).

A total of 81 Australian genera are now recognised, including the 34 described here as new. *Cicadetta* Kolenati, *Notopsalta* Dugdale, and *Quintilia* Stål are no longer considered to be represented in Australia. These generic changes have resulted in 74 new combinations and 12 species names falling as junior synonyms.

All generic descriptions are accompanied by figures of male genitalia (in most cases of the type species). For some genera additional figures included are wing venation, male opercula, head and body forms, and male and

female reproductive systems; the inclusion of these is not consistent and was largely dictated by the availability of figures. Habitus figures of most type species can be found in Moulds (1990); those not figured there are included in the colour plates accompanying this revision. Distribution maps are included for all genera based on published records.

For each genus, under the subheading 'Discussion', references are provided relating to published accounts of included species. These primarily incorporate publications appearing after 1990 and are not necessarily exhaustive; information on Australian cicadas published prior to 1990 has been previously summarised by Moulds (1990).

For some genera a review of selected species is provided. Such reviews mostly concern new synonymies or nomenclatorial discussion relating to the species concerned.

This study also presents the first key to genera for Australian cicadas that accommodates both males and females. A supplementary cladistic study is presented covering those genera with an exposed endotheca and a trifold theca that were inadequately represented in Moulds (2005a).

## ABBREVIATIONS

The following abbreviations have been used for the names of institutions mentioned in the text.

AM	Australian Museum, Sydney
ANIC	Australian National Insect Collection, Canberra
BMNH	The Natural History Museum, London
HOPE	Hope Entomological Collections, Oxford University Museum, Oxford
MHUB	Museum für Natukunde der Humboldt, Universität zu Berlin
MM	Macleay Museum, University of Sydney
MNHN	Museum National d'Histoire Naturelle, Paris
MV	Museum of Victoria, Melbourne
QM	Queensland Museum, Brisbane
SAM	South Australian Museum, Adelaide
UZMC	Universitets Zoologiske Museum, Copenhagen
WAM	Western Australian Museum, Perth
ZMH	Zoologischen Museums, Hamburg

## HISTORICAL REVIEW

Fabricius (1775) adopted Linnaeus's genus *Cicada* when describing the first Australian cicadas, which had been collected by Sir Joseph Banks during Cook's third voyage of discovery around the world. Over time the concept of the genus *Cicada* has narrowed and now includes just a small group of species restricted to the Palaearctic region but, remarkably, this genus has only recently been disassociated with the Australian cicada fauna (Moulds 1990).

All cicadas remained in *Cicada* until Burmeister (1835) erected *Hemidictya* for a distinctive South American species. Westwood (1840) added *Polyneura* and later *Cystosoma* for the Australian species *C. saundersii* (Westwood 1842b). Soon after, Amyot and Serville (1843) created 15 new genera of which five included Australian species. Commenting on these new genera, Westwood (1843) wrote 'Within the last few days has been published, M. Serville's volume . . . adopting the principle that every group of species logically constitutes a genus, we find the genus *Cicada* of modern authors broken up . . .'. By 1859, 31 of the then known 41 Australian species still remained in *Cicada* (Dohrn 1859).

The next half century saw a huge increase in both numbers of species and genera so that by the time the next world catalogue of cicadas appeared (Distant 1906d), 1038 species and 179 genera were recognized. Of these, 128 species in 32 genera were recorded from Australia. While Distant was preparing his catalogue, Goding and Froggatt (1904) published their monograph of the Australian Cicadidae with 119 species in 21 genera, including four

genera that they described as new. Like Distant, Goding and Froggatt included keys to genera and their monograph remained a basic reference to the Australian cicada fauna until A.N. Burns published his checklist of Australian cicadas (Burns 1957). By this time the known Australian cicada fauna had almost doubled to 206 species in 44 genera, in large part through the work of Ashton (1912a,c,d,e, 1914a,b, 1921) and Distant (1907, 1910, 1913a, 1914c, 1915) who together added most of the new genera and species.

When Metcalf (1963) published his world catalogue six years later no additional species or genera had been added to the Australian fauna. There was, however, one notable change. Eighty-three species (or some 40% of the known Australian fauna at that time) had been included by Burns (1957) in the single genus *Melampsalta* Kolenati. Metcalf (1963), however, distributed these species between *Pauropsalta* Goding and Froggatt and *Cicadetta* Kolenati for the following reasons. (a) Metcalf was following literature only to 1955 so he consequently retained the genus *Pauropsalta* even though Burns had placed it as a junior synonym of *Melampsalta* six years prior to the publication of Metcalf's work. (b) The question of status regarding *Melampsalta* and *Cicadetta* is a complex one, the confusion surrounding these two genera stemming from three sources: authorship of these genera, their type species, and their synonymy. These matters have already been discussed at length by Boulard (1988, 1998) and Moulds (1988) who concluded correctly at the time that both *Melampsalta* and *Cicadetta* should be recognised and both take Amyot (1847) as their author and date. However, recently the International Commission of Zoological Nomenclature suppressed Amyot's 1847 work as it relates to cicadas (Opinion 2165) making the names in it unavailable for nomenclatorial purposes; the names *Cicadetta* and *Melampsalta* now date from Kolenati (1857). Duffels and van der Laan (1985) adopted *Melampsalta* and *Pauropsalta* for the Australian species in question but those in *Melampsalta* were returned to *Cicadetta* (Moulds 1990) following the argument of Moulds (1988).

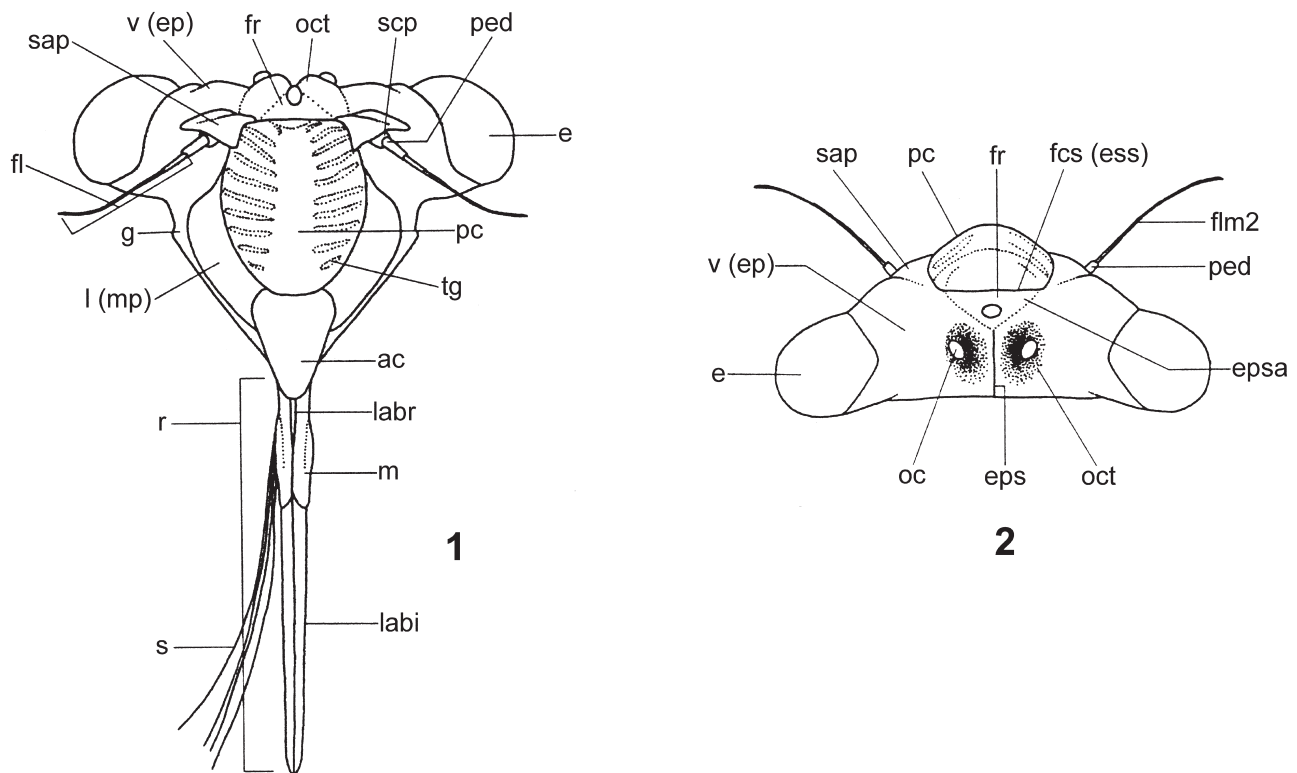
Apart from the discrepancies relating to *Cicadetta*, *Melampsalta* and *Pauropsalta* the genera and species for Australian cicadas in the catalogues of Burns (1957), Metcalf (1963) and Duffels and van der Laan (1985) are nearly identical; Duffels and van der Laan included just one additional genus (*Notopsalta* Dugdale, 1972).

In the most recent review of the Australian cicada fauna (Moulds 1990), 39 genera were recognised, five fewer than in Burns (1957). Two new genera (*Illyria* Moulds, 1985 and *Marteena* Moulds, 1986) were added, one was synonymised (*Paragudanga* Distant 1913), and the European genus *Cicada* was finally removed from an association with the Australian fauna through a species synonymy. Since 1990 13 further genera have been added to the Australian fauna; Boulard (1989) added the new genus *Chrysocicada*, de Boer (1993a 1995) added the new genus *Guineapsaltria* in addition to transferring Australian species to *Gymnotympana* Stål which also had the effect of removing *Baeturia* Stål, Ewart (2005a) and Ewart & Marques (2008) added *Caliginopsalta*, *Crotopsalta*, *Drymopsalta*, *Gagatopsalta*, *Graminitigrina* and *Pipilopsalta*, Moulds (2003, 2008) added *Talcopsaltria* and established *Aleeta* and *Tryella* as replacements for *Abrieta* species in the Australian fauna and most recently Popple & Emery (2010) added *Samaecicada*.

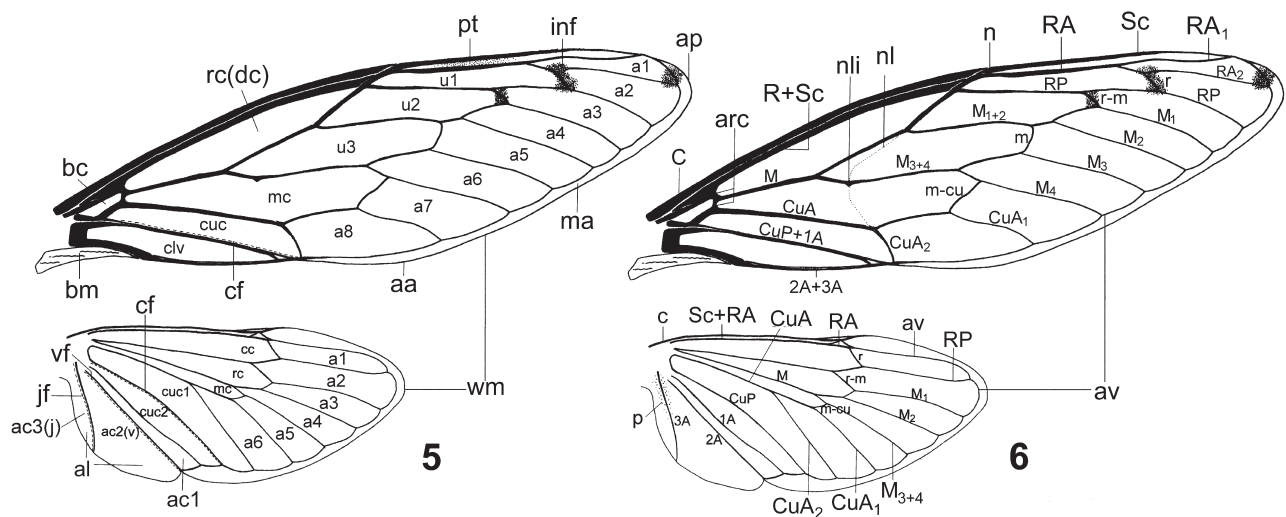
These additions raised the total number of genera represented in Australia to 50, just six more than the number catalogued by Burns (1957). The apparent shortfall, in large part, can be explained by the number of exotic species included doubtfully by Burns. Of these 50 genera, *Cicadetta* was by far the largest genus with 55 species, or 25% of the described Australian fauna (Moulds 1990). *Pauropsalta* was the second largest with 35 species (Ewart 1989b, Moulds 1990) followed by *Macrotristria* Stål with 21 species (Moulds 1990). These three genera together accounted for more than half of the known Australian species. The present review significantly alters these statistics. As mentioned earlier *Cicadetta* is excluded from the Australian fauna, *Pauropsalta* becomes the most speciose genus with 26 Australian species, and *Macrotristria* becomes the second largest genus with 18 Australian species.

## TERMINOLOGY

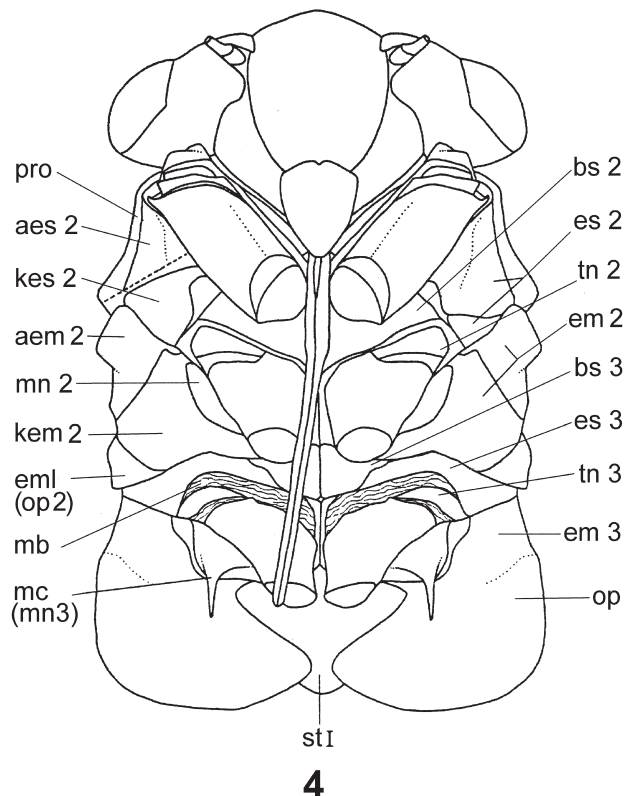
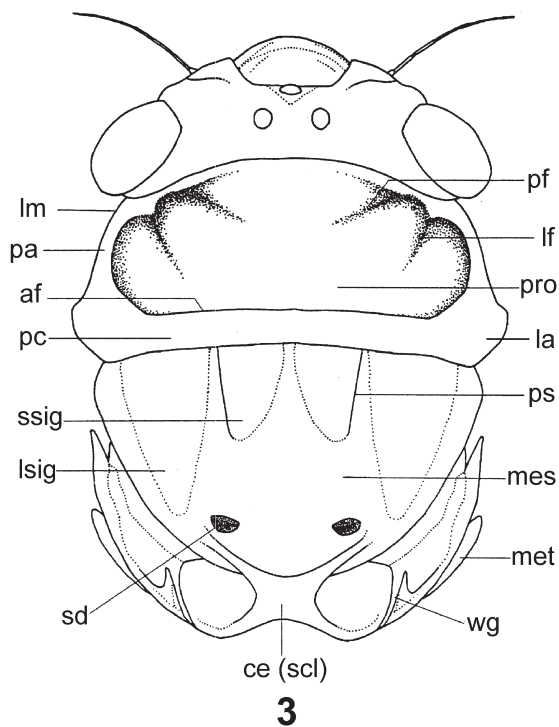
Morphological features mentioned in this work are illustrated in Figs 1–27. Terminology mostly follows that of Moulds (2005a). Terminology for timbal structures is adopted from Bennet-Clark (1997). Two structures, the anterior and posterior cranial depressions, are derived from Moulds (2008b).



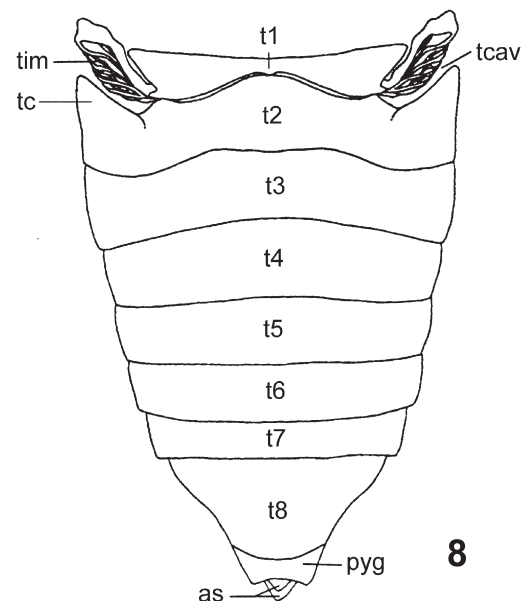
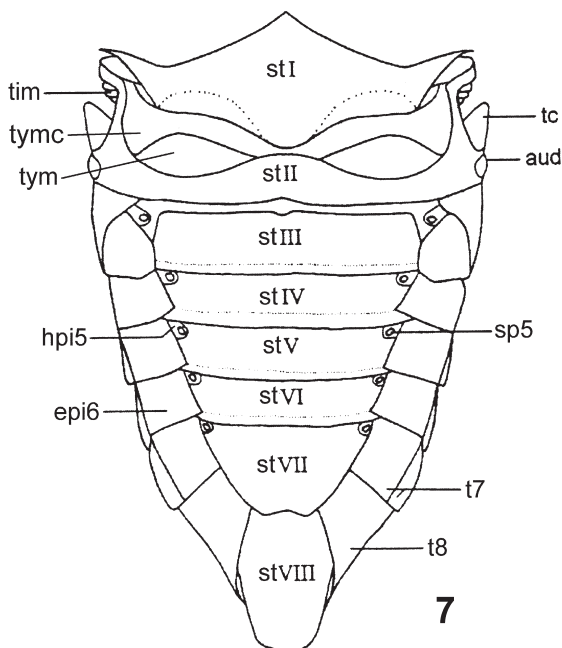
**FIGURES 1–2.** Head, *Tamasa tristigma*, Cicadinae: (1) anterior view; (2) dorsal view. Adapted from Moulds (2005a). Terminologies in brackets also in current use. **ac** anteclypeus; **e** compound eye; **eps** epicranial suture; **epsa** anterior arm of epicranial suture; **fcs (ess)** frontoclypeal suture, or epistomal suture; **fl** flagellum of antenna; **flm 2** second flagellomere; **fr** frons; **g** gena; **l (mp)** lorum, or mandibular plate; **labi** labium; **labr** labrum; **m** mentum; **oc** ocellus, median or lateral; **oct** ocular tubercle; **pc** postclypeus; **ped** pedicel; **r** rostrum; **s** stylets; **sap** supra-antennal plate; **scp** scape; **tg** transverse groove; **v (ep)** vertex, or epicranium.



**FIGURES 5–6.** Fore and hind wings, *Tamasa tristigma*, Cicadinae. (5) wing and cell notation; (6) vein notation. Adapted from Moulds (2005a). Terminologies in brackets are also in current use. **A** anal vein; **a** apical cell; **aa** anal angle; **ac1** anal cell 1; **ac2(v)** anal cell 2 or vannus; **ac3(j)** anal cell 3 or jugum; **al** anal lobe (= ac2 + ac3); **ap** apex of wing; **arc** arcus; **av** ambient vein; **bc** basal cell; **bm** basal membrane; **C** costal vein; **cc** costal cell; **cf** claval fold; **clv** clavus; **cuc** cubital cell; **CuA** cubitus anterior vein; **CuP** cubitus posterior vein; **inf** infuscation; **jf** jugal fold; **M** median vein; **m** medial crossvein; **ma** marginal area; **mc** medial cell, (also ulnar cell 4 on fore wing); **m-cu** mediocubital crossvein; **n** node; **nl** nodal line; **nli** nodal line intersection; **p** plaga; **pt** pterostigma (pigmentation); **R** radius; **r** radial crossvein; **RA** radius anterior; **rc (dc)** radial cell, or discal cell; **r-m** radiomedial crossvein; **RP** radius posterior; **Sc** subcostal vein; **u** ulnar cell; **vf** vannal fold; **wm** wing margin.

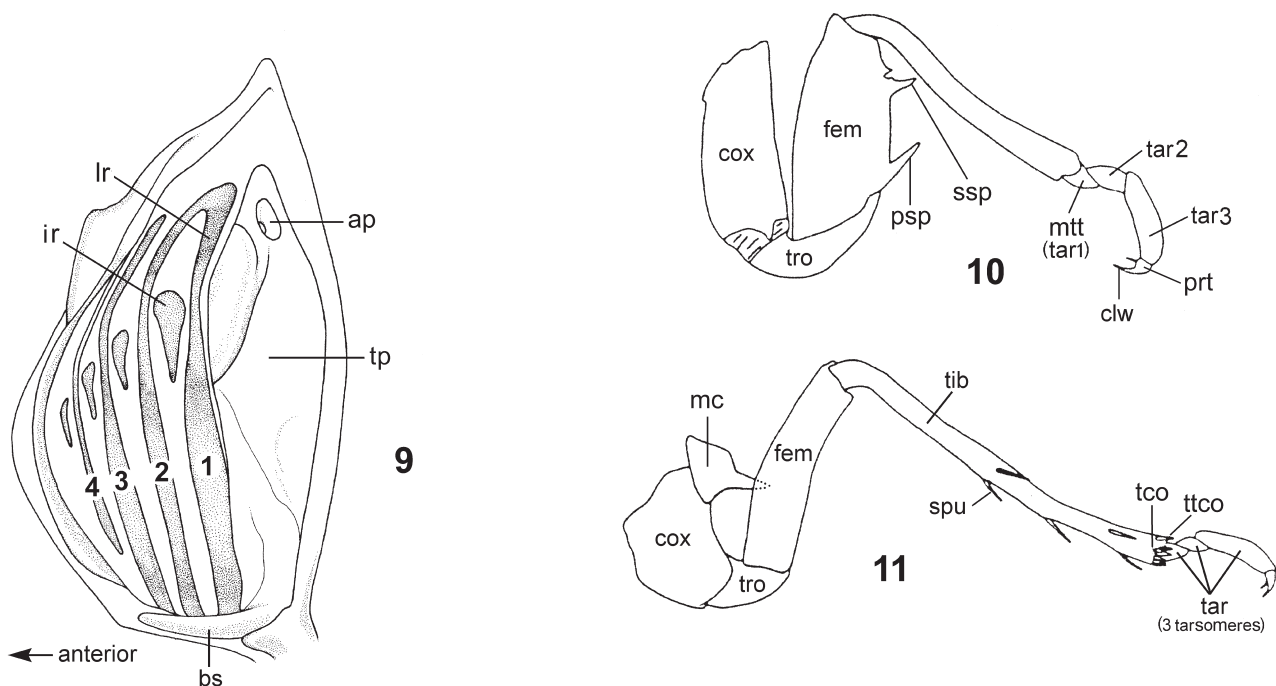


**FIGURES 3–4.** Male thorax, with head *in situ*, *Tamasa tristigma*, Cicadinae. (3) dorsal view; (4) ventral view. Adapted from Moulds (2005a). Terminologies in brackets also in current use. **aem 2** anepimeron 2; **aes 2** anepisternum 2; **af** ambient fissure of pronotum; **bs 2** basisternum 2; **bs 3** basisternum 3; **ce (scl)** cruciform elevation, or scutellum; **em 2** epimeron 2; **em 3** remnant of epimeron 3; **eml (op 2)** epimeral lobe, or operculum 2; **es 2** episternum 2; **es 3** episternum 3; **kem 2** katepimeron 2; **kes 2** katepisternum 2; **la** lateral angle of pronotal collar; **lf** lateral fissure; **lm** lateral margin of pronotum; **lsig** lateral sigillum; **mb** membrane; **mc (mn 3)** meracanthus, or meron 3; **mes** mesonotum; **met** metanotum; **mn 2** meron 2; **op** operculum (includes epimeron 3); **pa** paranotum (lateral part of pronotal collar); **pc** pronotal collar; **pf** paramedian fissure; **pro** pronotum; **ps** parapsidal suture; **sd** scutal depression; **ssig** submedian sigillum; **st I** abdominal sternite I; **tn 2** trochantin 2; **tn 3** trochantin 3; **wg** wing groove.

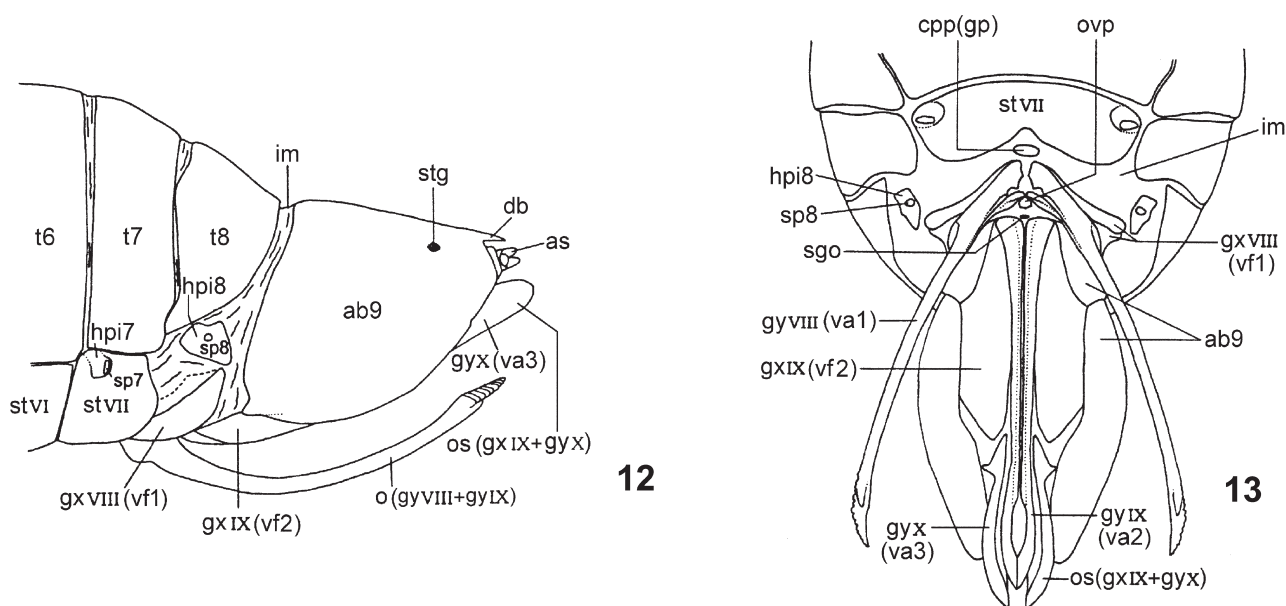


**FIGURES 7–8.** Male abdomen, *Tamasa tristigma*, Cicadinae: (7) abdomen, ventral view; (8) abdomen, dorsal view. Partly adapted from Moulds (2005a). **as** anal style; **aud** auditory capsule; **epi** epipleurite; **hpi** hypopleurite; **pyg** pygofer; **sp** spiracle; **st** sternite; **t** tergite; **tc** timbal cover; **tcav** timbal cavity; **tim** timbal; **tym** tympanum; **tymc** tympanal cavity.

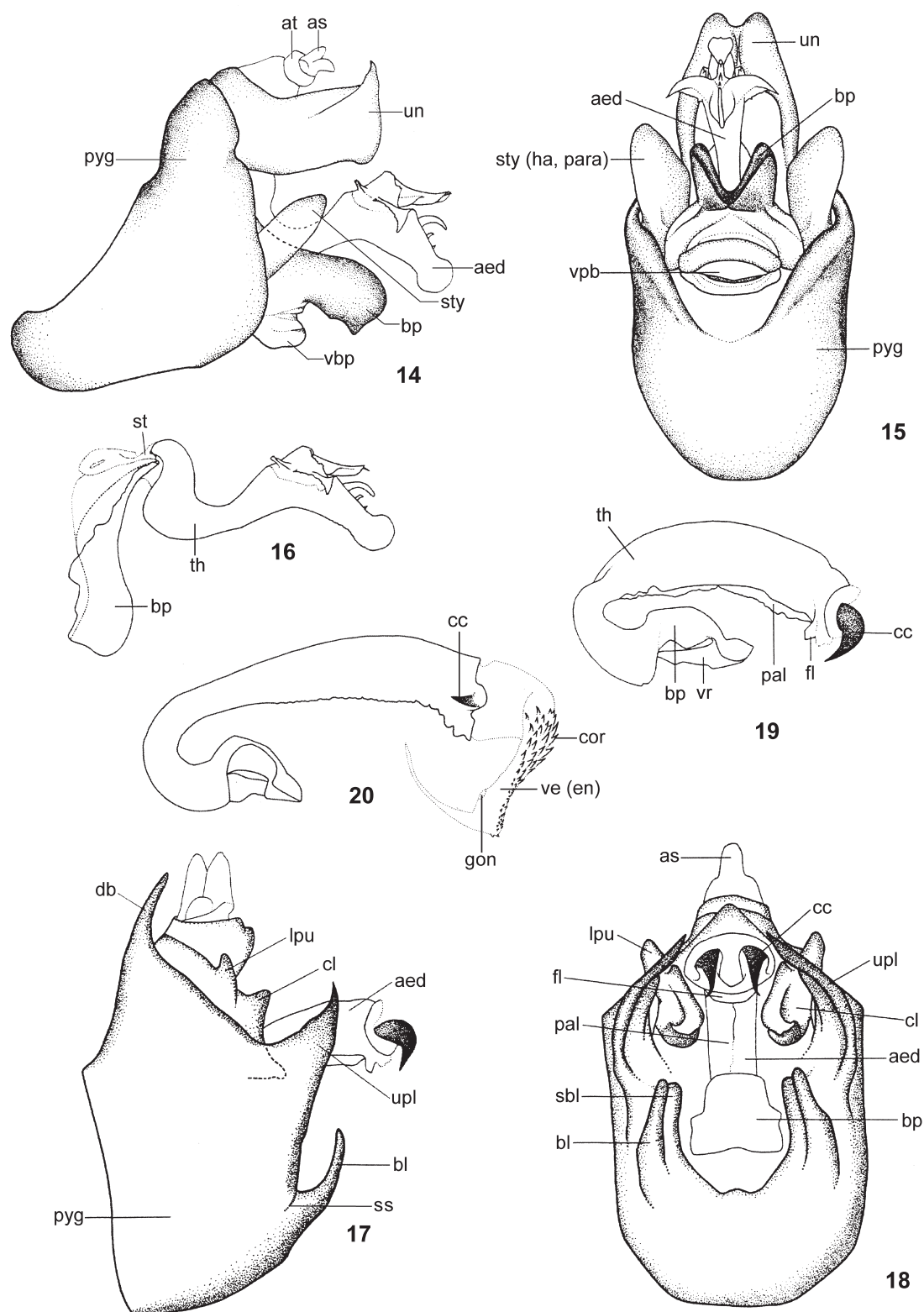




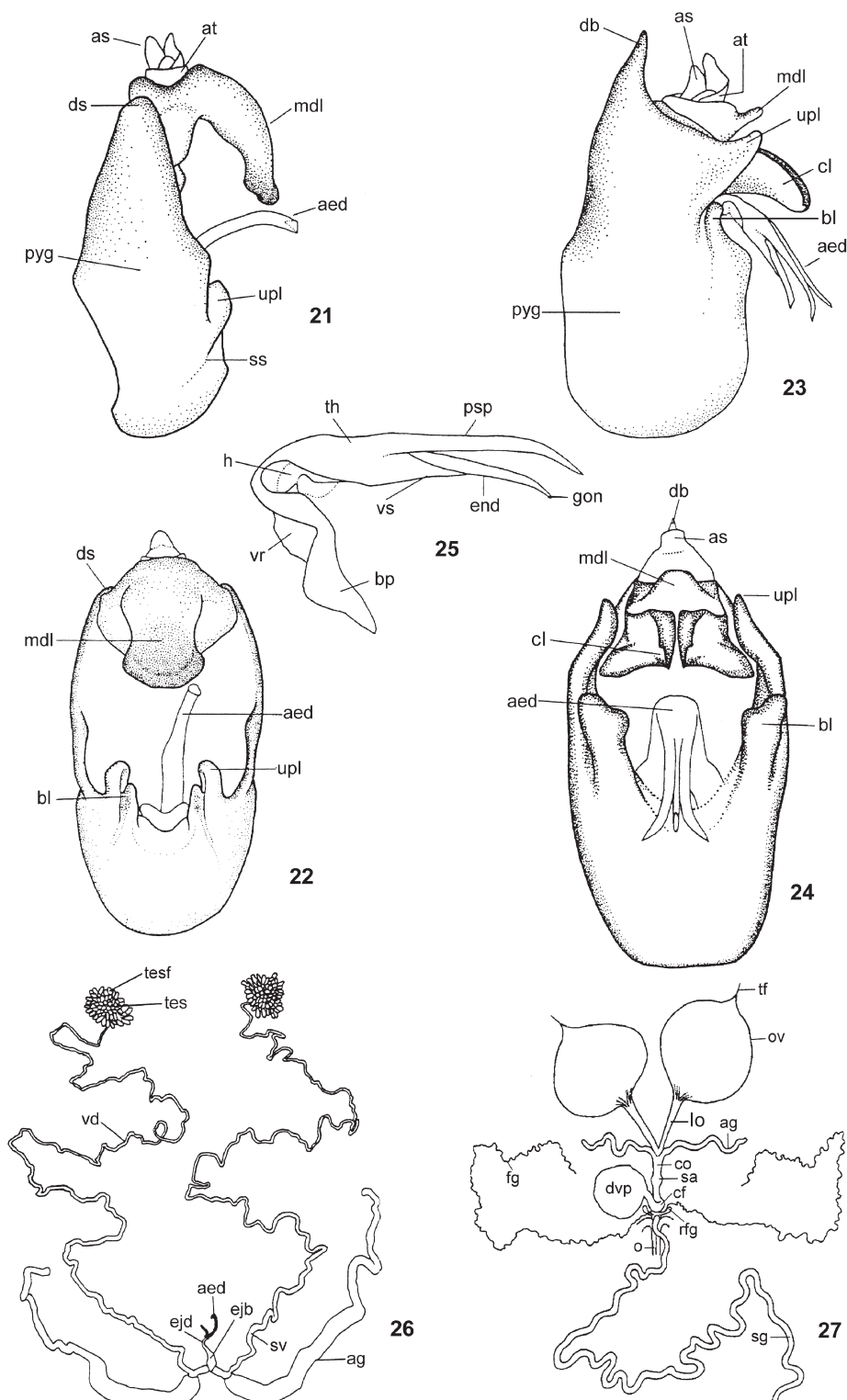
**FIGURES 9–11.** Male timbal and legs, *Tamasa tristigma*, Cicadinae: (9) left timbal with long ribs numbered, anterior at left; (10) fore leg; (11) hind leg. Partly adapted from Moulds (2005a). **ap** apodeme pit; **bs** basal spur; **clw** pretarsal claw; **cox** coxa; **fem** femur; **ir** intercalary rib; **lr** long rib; **mc** meracanthus; **mtt** metatarsus; **prt** pretarsus; **psp** primary spine of fore femur; **spu** tibial spur; **ssp** secondary spine of fore femur; **tar** tarsus; **tar1, 2, 3** tarsomeres 1, 2 or 3; **tco** tibial comb; **tib** tibia; **tp** timbal plate; **tro** trochanter; **ttco** thumb of tibial comb.



**FIGURES 12–13.** Female terminalia, *Arunta perulata*, Cicadinae: (12) lateral view with ovipositor free of sheath; (13) ventral view with ovipositor divided exposing ovipore and orifice of spermathecal gland. Adapted from Moulds (2005a). Terminologies in brackets are also in current use. **ab 9** abdominal segment 9 or tergite 9; **as** anal styles; **cpp (gp)** copulapore, or gonopore; **db** dorsal beak; **gx VIII, IX (vf 1, 2)** gonocoxites VIII and IX or valvifers 1 and 2; **gy VIII–X, (va 1–3)** gonapophyses VIII, IX or X or valvulae 1, 2 or 3; **hpi 7, 8** hypopleurites 7 and 8; **im** intersegmental membrane; **os** ovipositor sheath (= gonocoxite IX + gonapophysis X); **o** ovipositor (= gonapophyses VIII + IX); **ovp** ovipore; **sgo** orifice of spermathecal gland; **sp 7, 8** spiracles 7 and 8; **st VI, VII** sternites VI, VII; **stg** stigma; **t 6, 7, 8** tergites 6, 7 or 8.



**FIGURES 14–20.** Male genitalia: (14) lateral view, *Tettigarcta crinita*, Tettigarctidae; (15) ventral view, same species; (16) aedeagus, lateral view, same species. (17) lateral view, *Tryella ochra*, Cicadettinae; (18) ventral view, same species; (19) aedeagus, lateral view, same species; (20) aedeagus, lateral view, *Aleeta curvicosta*, Cicadettinae. Adapted from Moulds (2005a). **aed** aedeagus; **as** anal styles; **at** anal tube; **bl** basal lobe of pygofer; **bp** basal plate; **cl** clasper; **cc** conjunctival claw; **cor** cornuti; **db** dorsal beak; **fl** flabellum; **gon** gonopore; **lpu** lateral process of uncus; **pal** palearis; **pyg** pygofer; **sbl** secondary basal lobe of pygofer; **ss** sclerital suture; **st** sinewation; **sty (ha, para)** style (= harpagone or paramere); **th** theca; **un** uncus; **upl** upper lobe of pygofer; **vbp** ventro-basal pocket; **ve (en)** vesica (= endophallus); **vr** ventral rib.



**FIGURES 21–27.** Male genitalia: (21) lateral view, *Neopsaltoda crassa*, Cicadinae; (22) ventral view, same species; (23) lateral view, *Kobonga umbrimargo*, Cicadettinae; (24) ventral view, same species; (25) aedeagus, lateral view, same species; (26) male reproductive system, *Tamasa tristigma*, Cicadinae; (27) female reproductive system, dorsal view, *Arunta perulata*, Cicadinae. Terminology in brackets also in current use. Adapted from Moulds (2005a). **aed** aedeagus; **ag** accessory gland; **as** anal styles; **at** anal tube; **bl** basal lobe of pygofer; **bp** basal plate; **cf** carrefour; **cl** clasper; **co** common oviduct; **db** dorsal beak; **ds** distal shoulder; **dvp** dorsovaginal pouch; **ejb** ejaculatory bulb; **ejd** ejaculatory duct; **end** endotheca; **fg** filamentous gland; **gon** gonopore; **h** hinge; **lo** lateral oviduct; **mdl** median lobe of uncus; **o** ovipositor; **ov** ovary; **psp** pseudoparamere; **pyg** pygofer; **rfg** reservoir of filamentous gland; **sa** seminal ampoule; **sg** spermathecal gland; **sv** seminal vesicle of vas deferens; **tes** testis; **tesf** testicular follicles; **tf** terminal filament of ovary; **th** theca; **upl** upper lobe of pygofer; **vd** vas deferens; **vr** ventral rib; **vs** ventral support.



## MATERIALS AND METHODS

### Specimens

The identity of all described Australian species has been confirmed by reference to type material where it could be located. Male genitalic dissections were prepared from representatives of all species except *Pauropsalta rubra* (Goding and Froggatt) and *P. stigmatica* Distant, both of which were described from females and have no associated males, and *Pauropsalta castanea* Goding and Froggatt and *Macrotristria bindalia* Burns for which specimens were not available for dissection. Most of the specimens dissected were from the author's collection, otherwise from material (often type material) either in the AM or borrowed from ANIC, BMNH, HOPE, MM, MNHP, MV and SAM. Dissections of male and female reproductive systems were made from fresh material collected for that purpose.

### Dissection of male genitalia

Male genitalia (pygofer and allied structures) were removed from relaxed specimens to avoid damage during excision. The pygofer was carefully extracted from the terminal abdominal segments and cut loose, often in conjunction with sternite VIII which can be difficult to separate.

The extracted pygofer (with or without sternite VIII) was placed in 10% KOH at room temperature for 8–10 hours, washed, and transferred to 50% ethanol for a few minutes before placement in 75% ethanol for permanent storage. Excess muscle tissue and any attached intersegmental membrane were carefully removed prior to examination.

### Dissection of male reproductive system

The following procedure has proved effective and was developed by trial and error during more than 100 dissections.

Dissections were prepared from either freshly killed specimens or from frozen specimens. Specimens collected during field work were successfully stored on party ice (tested to two weeks) or dry ice prior to permanent deep freeze storage. Care should be taken not to dehydrate frozen specimens in 'frost free' freezers.

Dissections were performed under saline solution (approximately 0.6 g per 100 mL H<sub>2</sub>O) to which was added approximately 5% by volume of ethyl alcohol to partly harden and whiten delicate translucent tissue. Dissecting dishes incorporated a bottom layer of 'plasticine' so that specimens could be secured by entomological pins during dissection.

Specimens were dissected from dorsal aspect. Prior to dissection, tergites were cut along the dorsal midline by inserting iris scissors under tergite 8 and cutting forwards to tergite 1. Similarly, cuts were made either side of the abdomen in the lower lateral region. The abdomen was then cut from the thorax and transferred to the prepared dissecting dish. The specimen was submerged, and pinned exposing the internal abdominal tissues. Clearing away unwanted tissue then proceeded, a slow task often taking several hours and requiring considerable care and patience. The reproductive system is essentially held in place by tracheae. Special care had to be exercised when releasing the testes, which are positioned above the spiracles of sternite VI in all but *Tettigarcta*. One cannot expect to achieve a successful dissection at a first attempt; in fact multiple dissections are often needed to obtain good results. Drawings were completed prior to storage of dissections in 75% alcohol as shrinkage and distortion occur on transfer.

### Dissection of female reproductive system

Procedures were similar to those used for the male. Female reproductive systems, however, present a greater challenge because structures are more complex and the filamentous glands more delicate. The abdomen was left attached to the thorax until the ovaries had been released from their attachment to the thorax. Separation of the ovipositor from abdominal segment 9 required a substantial amount of cutting with iris scissors and was left until all soft tissue structures had been clearly identified.

## JUSTIFICATION FOR NEW GENERA

### Introduction and Overview

Twenty of the new genera described in this work possess morphological attributes that clearly distinguish them from all other described genera. A number of these new genera (and their distinctive attributes) are represented by their type species in the cladistic analysis of Moulds (2005a). The attributes elucidated in that analysis, together with autapomorphies not included in that analysis, form the basis for defining such genera here.

There remains, however, a group of genera that are not so clearly differentiated morphologically. These all fall within the tribe Cicadettini, and all possess an aedeagus with an exposed endotheca (traditionally known as a trifold aedeagus due to the *theca* terminating in three sharply-pointed structures, i.e. a pair of long, dorsolateral pseudoparameres and a shorter, spine-like ventral support, the latter resulting from a reduction of the theca that normally encapsulates the endotheca) (Fig 25), and at first these species appear to be congeneric. A recent, and as yet unpublished, molecular phylogenetic study by Hill, Marshall, Simon and others (Hill, Marshall, Simon, pers. comm.) suggests that these species are not congeneric as they are widely scattered among other species also with an exposed endotheca (plus others without an exposed endotheca) that constitute distinct, named genera such as the Australian genera *Froggattoides*, *Urabunana*, *Pipilopsalta*, *Caliginopsalta*, *Gagatopsalta* and *Drymopsalta*, the New Zealand genera *Notopsalta* and *Rhodopsalta*, and even the Northern Hemisphere genus *Tettigettalna* Puissant. To address the problem of generic placement of the most difficult of these species (i.e. those with an exposed and fleshy endotheca), I have undertaken a cladistic analysis of all such described Australian species plus representatives of the three non-Australian genera with an exposed, fleshy endotheca as previously mentioned, plus four species lacking an exposed endotheca (*Pauropsalta signata*, *Urabunana emma*, *U. festiva* and *U. marshalli*) because they are clearly closely allied to species in the analysis (a total of 71 species in all). The result corresponds well with the molecular data in so far as it identifies most of the same groupings of species here designated as new genera, interspersed between species comprising distinct, named genera that are very different in appearance, and not necessarily possessing a trifold aedeagus. The grouping of species with an exposed, fleshy endotheca into genera is thus based on this cladistic analysis, and the attributes which support the nodes form the basis of the generic definitions.

### Cladistic analysis

It should be noted that characters and character states identified here as meaningful for defining those Cicadettini with an exposed fleshy endotheca are supplementary to, and do not replace, the broader set of characters and character states previously identified by Moulds (2005a) for defining all Australian genera.

The species of Cicadettini with an exposed fleshy endotheca incorporated in the cladistic analysis below are listed in Table 1 together with the scoring of their character states. They include amongst others, four species of *Pauropsalta* incorrectly placed in that genus (because *Pauropsalta* does not have an exposed fleshy endotheca), the single Australian species of *Notopsalta*, the type species of *Notopsalta* from New Zealand, all species of *Kobonga*, the single described species of *Marteena*, all Australian species of *Cicadetta* with an exposed fleshy endotheca, all species of *Urabunana* with an exposed fleshy endotheca (but not the type species of *Urabunana* because it does not have an exposed fleshy endotheca and consequently represents a genus outside the study group), the type species of *Rhodopsalta* from New Zealand, and *Tettigettalna argentata* representing a group of closely related Palaearctic species with an exposed fleshy endotheca.

While this study concentrates only on the generic placement of described Australian species, it became necessary to include an additional species that was undescribed in the analysis to resolve the position of *Pauropsalta dubia* and *P. mixta*. These two species are very similar with a distinctive morphology clearly suggesting they are congeneric. However, one has five hind wing apical cells while the other usually has six. This discrepancy in scoring caused ambiguity (reduced structure) in the tree regarding these two species despite supporting synapomorphies. As most undescribed species believed to be congeneric with these two have six hind wing apical cells, one of these ("Pauropsalta dubia2") was added to the analysis which resolved this problem.

The following characters and character states, believed to be meaningful at generic level, were used in the cladistic analysis. Autapomorphic characters have been included where they were believed to define monotypic genera.

- 1 *Head width including eyes*: (0) about as wide or wider than mesonotum between wings; (1) clearly narrower than width of mesonotum between wings; (2) very narrow so that the distance between lateral ocellus and eye is less than diameter of ocellus.
- 2 *Pronotum in dorsal view*: (0) parallel-sided or widening towards posterior; (1) narrowing towards posterior. Note: Some individuals of species with a parallel-sided pronotum show a tendency for the pronotum to narrow towards the posterior; such individuals are not the norm and the narrowing is not pronounced and these species scored as '0'.
- 3 *Paranota*: (0) ampliate, (1) confluent with adjoining pronotal sclerites.
- 4 *Paranota*: (0) with no mid lateral tooth; (1) with a mid lateral tooth.  
Note: In some species scored as possessing a mid lateral tooth it can be absent or reduced in a few individuals. If a mid lateral tooth is present in most individuals the species is scored as having a tooth. Rare individuals of *Cicadetta crucifera* have a tooth (usually so on one side only); these individuals are considered atypical and the species is scored as lacking a tooth. Regardless of the scoring of this character for *C. crucifera* the tree topology does not change.
- 5 *Fore wing veins M and CuA*: (0) unfused or abutted on reaching basal cell; (1) meeting basal cell with their stems completely fused as one.  
Note: Most specimens of *Cicadetta convergens*, *C. issoides*, *C. torrida* and *Kobonga umbrimargo* have these veins fused but in some individuals they are not. In *K. froggatti* most individuals have these veins unfused but in a few they are fused. All of these cases are scored as '?'.  
6 *Fore wing costal vein of male*: (0) gently and evenly curved; (1) strongly bowed on distal half.
- 7 *Fore wing cross veins r, r-m and m*: (0) distance between r and r-m much less than distance between r-m and m; (1) distance between r and r-m about equal to or longer than between r-m and m.  
Note: This character is variable in *C. issoides* and has therefore been scored as '?'.  
8 *Fore wing apical cells*: (0) 3–6 about equal to or longer than ulnar cells; (1) mostly *very much* shorter than ulnar cells.
- 9 *Fore wing apical cells*: (0) 8 cells; (1) 9 cells.
- 10 *Fore wing radial cell*: (0) shorter than the distance from its apex to wing tip (about three quarters the length or more); (1) very short (about half the length of the distance from its apex to wing tip); (2) very long (about equal to or longer than distance from its apex to wing tip).  
Note: Scoring is based on typical specimens as the radial cell length in some species is sometimes variable.
- 11 *Fore wing infuscation*: (0) absent from crossvein m-cu; (1) present on crossvein m-cu.  
Note: Wing infuscations are usually not reliable indicators of generic relationships; similar infuscations often occur randomly within genera and in unrelated genera, most notably the fore wing infuscations overlying crossveins r and r-m. The infuscation scored here, like others below, is one of those less commonly encountered and has been included because it appears to support meaningful relationships within the genus *Kobonga*.
- 12 *Fore wing infuscation*: (0) absent from veins  $M_4$  and  $CuA_1$ ; (1) present on veins  $M_4$  and  $CuA_1$ .
- 13 *Fore wing infuscation*: (0) absent from ambient vein; (1) present along much of ambient vein.
- 14 *Hind wing apical cells*: (0) with 6 apical cells; (1) with 3, 4 or 5 apical cells.  
Note: Species normally with 5 hind wing apical cells usually have a small number of individuals with 4 or even 6 apical cells (usually only in one wing); such species are considered to have 5 apical cells and those minority individuals with 4 or 6 are regarded as abnormal. Alternatively, some species normally with 6 apical cells sometimes have 5 and such species are regarded as having 6.
- 15 *Hind wing infuscation*: (0) absent at distal end of vein 2A and adjacent part of ambient vein; (1) present at distal end of vein 2A and on adjacent part of ambient vein.
- 16 *Hind wing infuscation*: (0) absent from ambient vein ignoring region in vicinity of vein 2A; (1) present on ambient vein apart from region in vicinity of vein 2A.  
Note: While some wing infuscations are known to vary within genera, the presence of infuscation in this area has been shown to be reasonably consistent within genera and consequently has been included.
- 17 *Timbals*: (0) anterior part mostly occupied by ribs; (1) anterior part largely free of ribs.
- 18 *Timbals*: (0) with 3 or more long ribs spanning the full height of the timbal; (1) with 2 long ribs spanning the full height of the timbal.
- 19 *Timbal cavity posterior margin*: (0) ridged on lower half or so; (1) rounded and completely lacking a ridge on lower half or so.

Note: In some species (e.g., *Pauropsalta dubia* and *Cicadetta hackeri*) the ridge is difficult to discern and is best confirmed by a depression immediately posterior to the cavity edge.

20 *Male opercula*: (0) overall shape rounded with outer margin broadly rounded with a rounded apex directed towards abdominal midline; (1) overall shape longitudinally linear and almost parallel-sided, distally angular, no rounded apical extension towards abdominal midline.

21 *Male operculum base (remnant of epimeron 3)*: (0) normal; (1) much swollen and bubble-like.

22 *Male abdomen*: (0) as wide as or a little wider than thorax; (1) very much wider than thorax (approximately 1.4x wider).

23 *Male abdomen*: (0) not greatly abbreviated; (1) much abbreviated, ratio width/length 1.3 or less.

24 *Male tergite 1*: (0) narrow along dorsal midline; (1) wide and swollen around dorsal midline.

25 *Male tergite 2*: (0) measured along dorsal midline about as wide as tergites 3; (1) wide, wider along dorsal midline than any one of tergites 3–7.

Note: This character often shows variation between individuals because of distorted abdomens in dried specimens. Scoring is based on those specimens considered typical.

26 *Male sternites*: (0) normal, not unusually swollen; (1) swollen so that each is visible in lateral profile.

Note: Scoring is based on typical specimens as male sternites can be distorted in dried specimens.

27 *Pygofer in ventral view*: (0) ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; (1) very wide across upper lobes and thereafter strongly tapered to base.

28 *Pygofer upper lobe*: (0) moderately developed, clearly lobe-like; (1) weakly developed, more like a rounded protrusion than lobe; (2) undeveloped, barely discernible.

29 *Pygofer basal lobe in lateral view*: (0) curved evenly to apex; (1) with a subapical outward bump (Fig. 156a); (2) with much of distal margin a little protruding, angled, its margin straight or slightly incurved (Fig. 143a).

30 *Pygofer basal lobe in lateral view*: (0) abutted against, or partly tucked behind, pygofer margin; (1) clear of pygofer margin.

31 *Dorsal beak of male pygofer*: (0) with a developed apical spine or pointed apex (visible in dorsal view); (1) with no spine or pointed apex, completely straight or broadly curved across apical region;

32 *Dorsal beak of female abdominal segment 9*: (0) with a developed apical spine or pointed apex (visible in dorsal view); (1) without a spine or apical point, completely straight or broadly curved across apical region.

Note: Occasional specimens of *U. wollomombii*, *N. atrata*, *C. binotata*, *C. lactea* and *C. waterhousei* have a very small dorsal beaks; these are treated as abnormal individuals and for these species the dorsal beak is scored as absent.

33 *Claspers*: (0) unfused; (1) fused around midlength.

34 *Claspers*: (0) diverging towards distal ends; (1) distally parallel to each other.

35 *Claspers*: (0) tubular, tapering to a hooked beak-like distal end; (1) essentially flat, narrow in lateral view, outer face with an overhanging lip along margin; (2) essentially flat, wide in lateral view, outer face with an overhanging lip along upper margin; (3) claw-like with minimal cavity ventrally; (4) fang-like, excavated ventrally.

36 *Claspers*: (0) lacking a rounded, inward-facing swelling on proximal half or so of inner margin; (1) with a rounded, inward-facing swelling on inner margin.

37 *Claspers*: (0) their apices not widely separated, certainly nowhere near the widest dimensions of the claspers; (1) their apices very widely separated but not forming the widest dimensions of the claspers; (2) their apices very widely separated, forming the widest dimensions of the claspers.

38 *Hinge of aedeagus*: (0) possessing a chitinous back; (1) entirely fleshy.

39 *Basal plate*: (0) as long as or longer than broad; (1) short and broad; (2) exceedingly short, almost without length.

40 *Endotheca*: (0) permanently exposed, sclerotized; (1) permanently exposed, soft and fleshy; (2) not exposed.

41 *Pseudoparameres in dorsal view*: (0) turning in, then gradually diverging; (1) parallel for much of their length then diverging; (2) parallel for their entire length; (3) wide apart, diverging throughout their length; (4) converging throughout their length.

42 *Pseudoparameres in lateral view*: (0) aligned with thecal shaft for much of their length, distally usually turned down but sometimes nearly straight; (1) directed upwards compared to thecal shaft; (2) aligned with thecal shaft but gently curved down throughout its length.



- 43 *Pseudoparameres, proximal half or so*: (0) diverging from ventral support; (1) in line with ventral support.  
 44 *Pseudoparameres*: (0) unfused throughout their length; (1) fused for half their length or more.  
 45 *Ventral support*: (0) of medium length, no more than about half the length of pseudoparameres; (1) long, about three quarters or more the length of pseudoparameres.

*Gudanga boulayi* was chosen as the outgroup as it clearly falls outside the species of interest, e.g. those species with an exposed *fleshy* endotheca (Moulds 2005a). *Gudanga* species are unusual in that they have opaque black fore wings but nevertheless *G. boulayi* is sufficiently close to the ingroup taxa to possess all characters perceived as relevant in the analysis.

Data were analysed using the heuristic search parsimony algorithms implemented with PAUP\* version 4.0b2 (Swofford 1998). Tree searches utilized the tree bisection reconnection algorithm (TBR) conducting 1,000 random addition searches (RAS) starting from random trees; other settings were left at their default values. The set of shortest trees were filtered using the Filter Trees option to eliminate trees that were less resolved than other compatible trees in order to find the most resolved trees. The chosen tree shown in Fig. 28 was prepared using CLADOS version 1.2 (Nixon 1992) with DELTRAN optimization. Character numbers were adjusted to begin at '1', rather than the 'zero' default in order to make numbering of characters more logical.

All characters were unweighted and all multistate characters were treated as unordered. Missing and inapplicable character states were scored as '?'. The matrix of taxa and assigned states is given in Table 1. Refer to Figs 1–27 for explanations of morphological terms.

**TABLE 1.** Character matrix of the 71 species used in the parsimony analysis. Missing data and character states not relevant to a species are scored as "?".

Species	00000	00001	11111	11112	22222	22223	33333	33334	44444
	12345	67890	12345	67890	12345	67890	12345	67890	12345
<i>Gudanga boulayi</i> (outgroup)	00000	00000	00000	00000	00000	00000	00000	00000	00000
<i>Abrieta borealis</i>	00010	10000	00000	00000	00000	00000	00012	00000	00000
<i>Caliginopsalta percola</i>	01101	01000	00001	00000	00000	00000	00002	00111	20000
<i>Cicadetta adelaida</i>	00011	10000	00000	00000	00000	00000	00111	00001	00000
<i>Cicadetta apicata</i>	00011	00000	00000	00000	00000	00010	00012	00001	00100
<i>Cicadetta bellatrix</i>	00011	01000	00000	01010	10011	10000	00012	00101	00000
<i>Cicadetta binotata</i>	00101	01000	00000	00000	00001	10000	00012	00001	00100
<i>Cicadetta brevis</i>	00101	01000	00000	00010	00100	00000	00012	00001	10100
<i>Cicadetta convergens</i>	0001?	01000	00000	01010	10011	10000	00002	00101	0?000
<i>Cicadetta crucifera</i>	00101	01000	00000	00000	00001	10000	00012	00001	00100
<i>Cicadetta cuensis</i>	00101	01000	00000	00010	00000	00000	00012	00001	10100
<i>Cicadetta hackeri</i>	00101	01000	00000	00000	00000	00000	00003	00001	00101
<i>Cicadetta hermannsburgensis</i>	10101	01000	00000	00010	00001	00000	00003	00001	00100
<i>Cicadetta incipiens</i>	01111	01000	00000	00000	00000	00000	00012	00001	00100
<i>Cicadetta issoides</i>	0010?	0?001	10000	00010	00011	00000	00012	00001	10100
<i>Cicadetta labeculata</i>	00011	00000	00000	00000	00000	00000	00000	00001	00100
<i>Cicadetta labyrinthica</i>	00011	01000	00000	01010	10011	10000	00012	00101	00000
<i>Cicadetta lactea</i>	00101	01000	11100	00000	00001	10000	00012	00001	00100
<i>Cicadetta latorea</i>	00011	01000	00000	01010	10011	10000	00012	00101	00000
<i>Cicadetta mackinlayi</i>	00101	01000	00000	00000	00001	10000	00012	00001	00100
<i>Cicadetta melete</i>	00011	00000	00000	01000	10011	00000	00012	00101	31000
<i>Cicadetta mixta</i>	00101	01102	00010	00000	00001	00000	00012	00001	10100
<i>Cicadetta multifascia</i>	01111	01000	00000	00000	00000	00000	00012	00001	00100
<i>Cicadetta oldfieldi</i>	00101	01000	00000	00010	00000	00000	00012	00001	10100
<i>Cicadetta polita</i>	00101	01000	00000	00000	00000	00001	00003	00001	42000

continued next page

TABLE 1. (continued)

	00000 00001 11111 11112 22222 22223 33333 33334 44444
Species	12345 67890 12345 67890 12345 67890 12345 67890 12345
<i>Cicadetta puer</i>	01101 01000 00000 00010 00001 00000 00003 00001 00100
<i>Cicadetta quadricincta</i>	00011 01000 00000 01010 10011 10000 00012 00101 00000
<i>Cicadetta sancta</i>	00101 01000 00000 00010 00001 00000 00003 00001 00100
<i>Cicadetta spinosa</i>	00011 00000 00000 00000 10000 00000 00014 10011 01000
<i>Cicadetta stradbrokeensis</i>	00101 01002 00000 00000 00000 00000 00000 00001 00100
<i>Cicadetta torrida</i>	0001? 00000 00000 00100 00000 00000 00112 00001 00000
<i>Cicadetta tigris</i>	00011 10000 00000 00000 00000 00000 00111 00001 00100
<i>Cicadetta waterhousei</i>	00101 01000 11100 00000 00001 10000 00012 00001 00100
<i>Crotopsalta fronsacetes</i>	00101 01000 00000 00010 00000 01000 11011 00021 10100
<i>Crotopsalta leptotigris</i>	00101 01000 00010 00010 00000 01000 11011 00021 10100
<i>Crotopsalta plexis</i>	00101 01000 00000 00010 00000 01000 11011 00021 10100
<i>Crotopsalta poaecetes</i>	00101 01000 00000 00010 00000 01000 11011 00021 10100
<i>Crotopsalta strenulum</i>	00101 01000 00000 00010 00000 01000 11011 00021 10100
<i>Diemeniana cincta</i>	00010 00000 00001 00000 00000 00000 00012 00001 00000
<i>Diemeniana euronotiana</i>	00010 01000 00001 00000 00000 00000 00012 00001 00000
<i>Diemeniana frenchi</i>	00010 01000 00001 00000 00000 00000 00012 00001 00000
<i>Diemeniana hirsuta</i>	00010 00000 00001 00000 00000 00000 00012 00001 00000
<i>Diemeniana nevoissi</i>	00010 00000 00001 00000 00000 00000 00012 00001 00000
<i>Drymopsalta crepitum</i>	00101 01000 00000 00011 00000 01000 01011 00001 00100
<i>Drymopsalta daemeli</i>	00101 01000 00010 00011 00000 01000 00011 00001 00100
<i>Froggattoides pallidus</i>	20101 01010 00000 00010 00000 00200 00011 00101 10101
<i>Froggattoides typicus</i>	20101 01000 00000 00010 00000 00200 00011 00101 10101
<i>Gagatopsalta auranti</i>	00101 01000 00000 00000 00001 00020 00003 02001 02100
<i>Gagatopsalta obscura</i>	00101 01000 00000 00000 00001 00020 00003 02001 02100
<i>Kobonga apicans</i>	00011 00000 00100 10000 00000 00010 00012 00001 00100
<i>Kobonga froggatti</i>	0001? 00000 00100 10000 00000 00010 00012 00001 00100
<i>Kobonga fuscomarginata</i>	00011 00100 11100 00000 00000 00010 00012 00001 00100
<i>Kobonga godingi</i>	00011 00100 11100 00000 ?0000 00010 00012 00001 00100
<i>Kobonga oxleyi</i>	00011 00100 11100 00000 00000 00010 00012 00001 00100
<i>Kobonga umbrimargo</i>	0001? 00100 11100 00000 00000 00010 00012 00001 00100
<i>Marteena rubricincta</i>	00010 00000 00000 00000 10000 00000 00014 10011 01000
<i>Notopsalta atrata</i>	00101 01000 00000 00000 00001 10000 00012 00001 00100
<i>Notopsalta sericea</i>	00011 01000 00000 00000 00000 00000 00012 00001 00100
<i>Pauropsalta dubia</i>	00101 01102 00000 00000 00001 00000 00012 00001 10100
<i>Pauropsalta 'dubia2'</i>	00101 01102 00000 00000 00001 00000 00012 00001 10100
<i>Pauropsalta nodicosta</i>	00101 11002 00010 0??1? 00000 00000 00012 00001 10101
<i>Pauropsalta signata</i>	00101 01100 00010 00010 00000 10100 00003 00012 12?1?
<i>Pipilopsalta ceuthoviridis</i>	00101 01000 00000 00010 00000 10100 00003 00021 00110
<i>Quintilia infans</i>	00100 01000 00000 00000 0000? 00000 00001 00001 00000
<i>Rhodopsalta cruentata</i>	00011 01000 00000 00100 00000 00000 00002 00011 00100
<i>Tettigettalna argentata</i>	00101 01000 00000 00000 00000 00000 00003 00001 02000
<i>Urabunana emma</i>	00101 01000 00010 00010 01001 10100 00003 01012 31?1?
<i>Urabunana festiva</i>	00101 01000 00010 00010 01000 10100 00003 01012 31?1?
<i>Urabunana leichardti</i>	00101 01000 00010 00010 01001 10100 00003 00011 00110
<i>Urabunana marshalli</i>	00101 01000 00010 00010 01001 10100 00003 01012 31?1?
<i>Urabunana verna</i>	00101 11002 00010 00010 00000 00000 00011 00001 00101
<i>Urabunana wollomombii</i>	00111 01000 00000 00000 00001 10000 00012 00001 00100

Results from the analyses found 18 shortest trees of length of 121, CI 48 and RI 84. These 18 trees included just two incompatible trees, the others being less resolved versions of one or the other of these two trees. These two incompatible shortest trees differed only in the interchanging of positions of *Urabunana leichardti* and *Pauropsalta signata* and it is one of these two trees shown in Fig. 28.

The two incompatible shortest trees supported most previously described genera in monophyletic clades. In addition they supported clusters of species that could be interpreted as potential new genera. Interestingly, a number of species, primarily those currently placed in the genera *Cicadetta*, *Urabunana* and *Pauropsalta*, were scattered widely through the trees between distinctive described genera such as *Froggattoides*, *Urabunana*, *Gagatopsalta*, *Caliginopsalta*, *Rhodopsalta* and *Kobonga*, while others clustered within clades potentially definable as new genera.

Support for nodes forming the basic structure of the tree was weak with only 12 nodes (or 25% of the nodes) supported by a bootstrap value above 70% (Fig. 28). However, some parts of the structure of the tree, and more importantly all its putative generic groupings, were similar to the unpublished results from molecular analyses of these species by Hill, Marshall, Simon, *et al.* (pers. comm.). Further, some support for the basic structure is suggested by two trends in character transformation through the tree. The first concerns the dorsal beak of the male pygofer. This tends to be strongly developed as a long spine-like structure in those species in clades branching near the base of the tree; further up the tree the dorsal beak tends towards being a pointed apex to the pygofer rather than a spine-like structure and is only absent in the genus *Crotopsalta*, at the top of the tree. Likewise, an absence of a dorsal beak in the female is found only in species branching at the top of the tree, viz. *Crotopsalta* species and *Drymopsalta crepitum*. The second relates to the separation or fusion of fore wing veins M and CuA when they meet the basal cell. They are clearly unfused in *Abrieta borealis* and all species of *Diemeniana*, the genera that are the sister clades to all other species in the analysis; this condition is plesiomorphic (Moulds 2005a). In three clades near the base of the tree there are some species in which these veins are completely unfused (in *Marteena* and some individuals of *K. froggatti* and *K. umbrimargo*), and some in the same clades where some individuals have these veins almost separated (*Cicadetta convergens*, *C. latorea*, *C. torrida*, *Kobonga froggatti* and *K. umbrimargo*). Beyond these basal branchings the fusion of M and CuA is more consolidated with no reversals but for one exception (*Quintilia infans*) and the length of the fusion tends to be longer. Thus, for the most part, the plesiomorphic condition (unfused veins) resides in clades branching at or near the base of the tree while the apomorphic condition (fused veins) is strongest in the upper clades of the tree.

### Selection of generic groupings

The decision for defining the limits of new generic groupings in species with an exposed fleshy endotheca was based upon defined groupings in the cladistic analysis, taking into account the degree of difference between sister clades and identifiable apomorphies (Fig. 28), and keeping in mind that these groupings were also supported in the molecular studies of Hill, Marshall, Simon, *et al.* New genera are thus defined by the apomorphies in the tree distinguishing their clades, in addition to the absence of apomorphies defining sister clades.

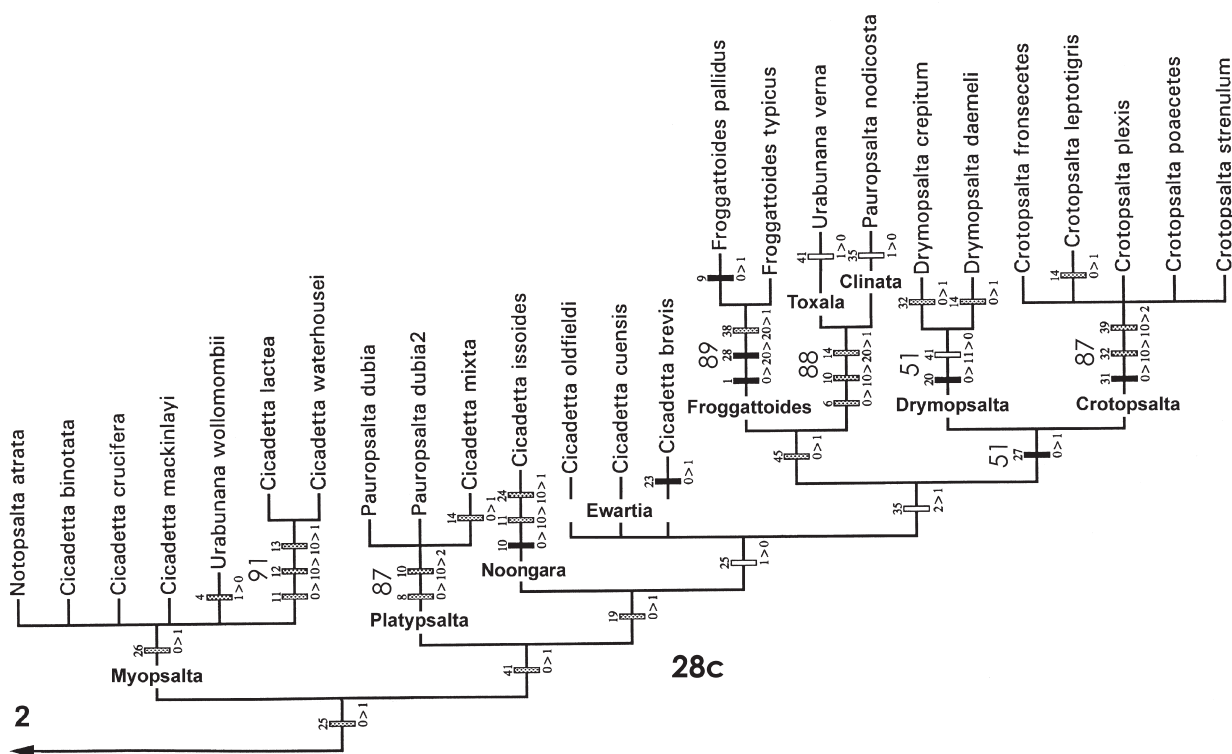
Sixteen of the new genera proposed in the analysis are monotypic but this unusually high number of monotypics is misleading. Collections of cicadas and molecular studies by Hill, Marshall and Simon (pers. comm.) show that only about one third of the Australian cicada fauna is described and the majority of the monotypic genera proposed here are in fact not monotypic. Our current knowledge suggests that, of the genera described here, only *Galanga* **gen. n.**, *Limnopsalta* **gen. n.** and *Toxala* **gen. n.** are likely to remain monotypic.

The cladistic analysis shows that the single Australian species currently placed in *Notopsalta*, *N. atrata*, is not congeneric with the type species of the genus from New Zealand, but instead groups with six other Australian species clearly separated from true *Notopsalta* by one synapomorphy and two homoplasious apomorphies; this distinct grouping is here considered to represent the new genus *Myopsalta*.

The single species of *Quintilia* and none of the species of *Urabunana* or *Pauropsalta* included in the analysis belong to those genera because their type species differ significantly in genitalic and other features. *Quintilia infans* falls as the sister to the monotypic *Caliginopsalta percola* but certainly is not congeneric, the two differing by seven apomorphies albeit mostly homoplasious ones; thus *Quintilia infans* is considered to represent a new monotypic genus *Terepsalta*. Similarly, generic distinction has been made between *Marteena rubricincta* and its sister *Cicadetta spinosa* because they are very different in appearance and one has completely unfused veins M and CuA and the other substantially fused. *Cicadetta hackeri* and *C. stradbokensis* have been treated as monotypic genera







**FIGURE 28. a–c.** One of the 18 most parsimonious trees derived using the procedure described in the text above (length 121, CI 49, RI 84) from an analysis of 71 species of Cicadettini with an exposed endotheca, employing *Gudanga boulayi* as the outgroup, with all characters unordered and equally weighted. Names at nodes are those of genera as recognized in this paper. Numbers at nodes are bootstrap values >50% from 1000 replications. Character transformations shown at nodes (generated using Clados) include autapomorphies that help define genera: black bars = non-homoplasious forward change; grey bars = homoplasious forward change; white bars = reversal (whether homoplasious or not).

because they differ in three significant apomorphies and no synapomorphy could be found to place them together or with another clade. *Cicadetta sancta*, *C. puer* and *C. hermannsburgensis* are also distinctive in overall appearance (Pls 1 and 2) and are placed as monotypic genera. The selection of other generic groupings was dictated by the degree of similarity of their members and degree of difference from adjoining clades, the latter sometimes being previously described genera with distinctive features.

### Summary of classification for Australian Cicadoidea

The following list uses the higher classification proposed by Moulds (2005a) and the amended arrangement of the tribe Cicadini proposed by Lee (2008) and Lee and Hill (2010).

Family TETTIGARCTIDAE Distant, 1905  
 Subfamily TETTIGARCTINAE Distant, 1905  
 Tribe TETTIGARCTINI Distant, 1905  
*Tettigarcta* White, 1845  
     *crinita* Distant, 1883  
     *tomentosa* White, 1845

Family CICADIDAE Latreille, 1802  
 Subfamily CICADINAE Latreille, 1802  
 Tribe PLATYPLEURINI Schmidt, 1918  
*Oxypleura* Amyot & Serville, 1843  
     *calypso* (Kirby, 1889)

Tribe TALCOPSALTRIINI Moulds, 2008  
*Talcopsaltria* Moulds, 2008  
     *olivei* Moulds, 2008

Tribe THOPHINI Distant, 1904

*Thopha* Amyot and Serville, 1843

*colorata* Distant, 1907

*emmotti* Moulds, 2000

*hutchinsoni* Moulds, 2008

*saccata* (Fabricius, 1803)

*sessiliba* Distant, 1892

*Arunta* Distant, 1904

*interclusa* (Walker, 1858)

*perulata* (Guérin-Méneville, 1831)

Tribe CRYPTOTYMPANINI Handlirsch, 1925

*Anapsaltoda* Ashton, 1921

*pulchra* (Ashton, 1921)

*Neopsaltoda* Distant, 1910

*crassa* Distant, 1910

*Psaltoda* Stål, 1861

*adonis* Ashton, 1914

*antennetta* Moulds, 2002

*aurora* Distant, 1881

*brachypennis* Moss & Moulds, 2000

*claripennis* Ashton, 1921

*flavescens* Distant, 1892

*fumipennis* Ashton, 1912

*harrisii* (Leach, 1814)

*insularis* Ashton, 1914

*maccallumi* Moulds, 2002

*magnifica* Moulds, 1984

*moerens* (Germar, 1834)

*mossi* Moulds, 2002

*pictibasis* (Walker, 1858)

*plaga* (Walker, 1850)

*Macrotristria* Stål, 1870

*angularis* (Germar, 1834)

*bindalia* Burns, 1964

*doddi* Ashton, 1912

*dorsalis* Ashton, 1912

*douglasi* Burns, 1964

*extrema* (Distant, 1892)

*frenchi* (Distant, 1892)

*godingi* Distant, 1907

*hieroglyphicalis* (Kirkaldy, 1909)

*intersecta* (Walker, 1850)

*kabikabia* Burns, 1964

*kulungura* Burns, 1964

*lachlani* Moulds, 1992

*maculicollis* Ashton, 1914

*sylvara* (Distant, 1901)

*thophoides* Ashton, 1914

*vittata* Moulds, 1992

*worora* Burns, 1964

*Illyria* Moulds, 1985

*australensis* (Kirkaldy, 1909)

*burkei* (Goding & Froggatt, 1904)

*hilli* (Ashton, 1921)

*major* Moulds, 1985

*Arenopsaltria* Ashton, 1921

*fullo* (Walker, 1850)

*nubivena* (Walker, 1858)

*pygmaea* (Distant, 1904)

*Henicopsaltria* Stål, 1866

*danielsi* Moulds, 1993

*eydouxii* (Guérin-Méneville, 1838)

*kelsalli* Distant, 1910

*rufivelum* Moulds, 1978

Tribe CYCLOCHILINI Distant, 1904

*Cyclochila* Amyot & Serville, 1843

*australasiae* (Donovan, 1805)

*virens* Distant, 1906

Tribe CICADINI Latreille, 1802

Subtribe COSMOPSALTRIINA Kato, 1932

*Diceropyga* Stål, 1870

*subapicalis* (Walker, 1868)

Tribe TAMASINI Moulds, 2005

*Tamasa* Distant, 1905

*burgessi* (Distant, 1905), **comb. n.**

*doddi* (Goding & Froggatt, 1904)

*rainbowi* Ashton, 1912

*tristigma* (Germar, 1834)

*Parnkalla* Distant, 1905

*muelleri* (Distant, 1882)

*Parnquila* **gen. n.**

*hillieri* Distant, 1906, **comb. n.** (nec *hillieri* Distant, 1907)

*magna* (Distant, 1913), **comb. n.**

*venosa* Distant, 1907, **comb. n.**

*unicolor* (Ashton, 1921), **comb. n.**

Tribe BURBUNGINI Moulds, 2005

*Burbunga* Distant, 1905

*albofasciata* Distant, 1907

*aterrima* (Distant, 1914)

*gilmorei* (Distant, 1882)

*hillieri* (Distant, 1907), **comb. n.** (nec *hillieri* Distant, 1906)

*inornata* Distant, 1905

*nanda* (Burns, 1964), **comb. n.**

*nigrosignata* (Distant 1904), **comb. n.**

*occidentalis* (Distant, 1912), **comb. n.**

*parva* Moulds, 1994

*queenslandica* Moulds, 1994

Tribe JASSOPSALTRIINI Moulds, 2005

*Jassopsaltria* Ashton, 1914

- rufifacies* Ashton, 1914
- Subfamily CICADETTINAE Buckton, 1889  
 Tribe TAPHURINI Distant, 1905  
 Subtribe TRYELLINA Moulds, 2005  
*Aleeta* Moulds, 2003  
   *curvicosta* (Germar, 1834)  
*Tryella* Moulds, 2003  
   *adela* Moulds, 2003  
   *burnsi* Moulds, 2003  
   *castanea* (Distant, 1905)  
   *crassa* Moulds, 2003  
   *graminea* Moulds, 2003  
   *infuscata* Moulds, 2003  
   *kauma* Moulds, 2003  
   *lachlani* Moulds, 2003  
   *noctua* (Distant, 1913)  
   *occidens* Moulds, 2003  
   *ochra* Moulds, 2003  
   *rubra* (Goding & Froggatt, 1904)  
   *stalker*i (Distant, 1907)  
   *willsi* (Distant, 1882)  
*Chrysocicada* Boulard, 1989  
   *franceaustraliae* Boulard, 1989  
*Pictila* **gen. n.**  
   *occidentalis* (Goding & Froggatt, 1904), **comb. n.**
- Tribe PRASIINI Matsumura, 1917  
*Lembeja* Distant, 1883  
   *paradoxa* (Karsch, 1890)  
   *vitticollis* (Ashton, 1912)
- Tribe CICADETTINI Buckton, 1889  
*Samaecicada* Popple and Emery, 2010  
   *subolivacea* (Ashton, 1912)  
*Gudanga* Distant, 1905  
   *adamsi* Moulds, 1996  
   *aurea* Moulds, 1996  
   *boulayi* Distant, 1905  
   *browni* (Distant, 1913)  
   *kalgoorliensis* Moulds, 1996  
   *pterolongata* Olive, 2007  
   *solata* Moulds, 1996  
*Adelia* **gen. n.**  
   *borealis* (Goding & Froggatt, 1904), **comb. n.**  
*Diemeniana* Distant, 1905  
   *cincta* (Fabricius, 1803) **comb. n.**  
   *euronotiana* (Kirkaldy, 1909)  
   *frenchi* (Distant, 1907)  
   *hirsuta* (Goding and Froggatt, 1904)  
   *neboissi* Burns, 1958  
*Uradolichos* **gen. n.**  
   *longipennis* (Ashton, 1914), **comb. n.**  
*Pauropsalta* Goding & Froggatt, 1904  
   *aktites* Ewart, 1989  
   *annulata* Goding & Froggatt, 1904  
   *aquila* Ewart, 1989  
   *ayrensis* Ewart, 1989  
   *borealis* Goding & Froggatt, 1904  
   *collina* Ewart, 1989  
   *corticina* Ewart, 1989  
   *dolens* (Walker, 1850)  
   *elgneri* (Ashton, 1912)  
   *encaustica* (Germar, 1834)  
   *extensa* Goding and Froggatt, 1904  
   *extrema* (Distant, 1892)  
   *fuscata* Ewart, 1989  
   *infrasila* Moulds, 1987  
   *infuscata* (Goding & Froggatt, 1904)  
   *melanopygia* (Germar, 1834)  
   *mneme* (Walker, 1850)  
   *nigristriga* Goding & Froggatt, 1904  
   *opaca* Ewart, 1989  
   *prolongata* Goding & Froggatt, 1904  
   *rubea* (Goding & Froggatt, 1904)  
   *rubra* Goding & Froggatt, 1904  
   *rubristrigata* (Goding & Froggatt, 1904)  
   *siccana* Ewart, 1989  
   *stigmatica* Distant, 1905  
   *walker*i Moulds & Owen, 2011  
*Graminitigrina* Ewart & Marques, 2008  
   *bolloni* Ewart & Marques, 2008  
   *bowensis* Ewart & Marques, 2008  
   *carnarvonensis* Ewart & Marques, 2008  
   *karumbae* Ewart & Marques, 2008  
   *triodiae* Ewart & Marques, 2008  
*Palapsalta* **gen. n.**  
   *circumdata* (Walker, 1852), **comb. n.**  
   *eyrei* (Distant, 1882), **comb. n.**  
   *virgulatus* Ewart, 1989, **comb. n.**  
   *vitellinus* (Ewart, 1989), **comb. n.**  
*Nanopsalta* **gen. n.**  
   *basalis* (Goding & Froggatt, 1904), **comb. n.**  
*Punia* **gen. n.**  
   *minima* (Goding & Froggatt, 1904), **comb. n.**  
*Neopunia* **gen. n.**  
   *graminis* (Goding & Froggatt, 1904), **comb. n.**  
*Kikihia* Dugdale, 1972  
   *convicta* (Distant, 1892)  
*Marteena* Moulds, 1986  
   *rubricincta* (Goding & Froggatt, 1904)

- Auscala* **gen. n.**  
*spinosa* (Goding & Froggatt, 1904), **comb. n.**
- Birrima* Distant, 1906  
*castanea* (Goding & Froggatt, 1904)  
*varians* (Germar, 1834)
- Yoyetta* **gen. n.**  
*aaede* (Walker, 1850), **comb. n.**  
*abdominalis* (Distant, 1892), **comb. n.**  
*celis* (Moulds, 1988), **comb. n.**  
*denisoni* (Distant, 1893), **comb. n.**  
*hunterorum* (Moulds, 1988), **comb. n.**  
*incepta* (Walker, 1850), **comb. n.**  
*landsboroughi* (Distant, 1882), **comb. n.**  
*toowoombae* (Distant, 1915), **stat.rev., comb. n.**  
*tristrigata* (Goding & Froggatt, 1904), **comb. n.**
- Taurella* **gen. n.**  
*forresti* (Distant, 1882), **comb. n.**  
*froggatti* (Distant, 1907), **comb. n.**  
*viridis* (Ashton, 1912), **comb. n.**
- Urabunana* Distant, 1905  
*sericeivitta* (Walker, 1862)
- Sylphoides* **gen. n.**  
*arenaria* (Distant, 1907), **comb. n.**
- Pyropsalta* **gen. n.**  
*melete* (Walker, 1850), **comb. n.**
- Physeema* **gen. n.**  
*bellatrix* (Ashton, 1914), **comb. n.**  
*convergens* (Walker, 1850), **comb. n.**  
*labyrinthica* (Walker, 1850), **comb. n.**  
*latorea* (Walker, 1850), **comb. n.**  
*quadricincta* (Walker, 1850), **comb. n.**
- Gelidea* **gen. n.**  
*torrida* (Erichson, 1842), **comb. n.**
- Clinopsalta* **gen. n.**  
*adelaida* (Ashton, 1914), **comb. n.**  
*tigris* (Ashton, 1914), **comb. n.**
- Galanga* **gen. n.**  
*labeculata* (Distant, 1892), **comb. n.**
- Kobonga* Distant, 1906  
*apicans* Moulds & Kopestonsky, 2001  
*apicata* (Ashton, 1914), **comb. n.**  
*froggatti* Distant, 1913  
*fuscomarginata* (Distant, 1914)  
*godingi* (Distant, 1905)  
*oxleyi* (Distant, 1882)  
*umbrimargo* (Walker, 1858)
- Plerapsalta* **gen. n.**  
*incipiens* (Walker, 1850), **comb. n.**  
*multifascia* (Walker, 1850), **comb. n.**
- Caliginopsalta* Ewart, 2005  
*percola* Ewart, 2005
- Terepsalta* **gen. n.**  
*infans* (Walker, 1850), **comb. n.**
- Telmapsalta* **gen. n.**  
*hackeri* (Distant, 1915), **comb. n.**
- Limnopsalta* **gen. n.**  
*stradbokensis* (Distant, 1915), **comb. n.**
- Heliopsalta* **gen. n.**  
*polita* Popple, 2003, **comb. n.**
- Gagatopsalta* Ewart, 2005  
*auranti* Ewart, 2005  
*obscura* Ewart, 2005
- Simona* **gen. n.**  
*sancta* (Distant, 1913), **comb. n.**
- Chelapsalta* **gen. n.**  
*puer* (Walker, 1850), **comb. n.**
- Erempsalta* **gen. n.**  
*hermannsburgensis* (Distant, 1907), **comb. n.**
- Pipilopsalta* Ewart, 2005  
*ceuthoviridis* Ewart, 2005
- Dipsopsalta* **gen. n.**  
*signata* (Distant, 1914), **comb. n.**
- Paradina* **gen. n.**  
*leichardti* (Distant, 1882), **comb. n.**
- Mugadina* **gen. n.**  
*emma* (Goding & Froggatt), **comb. n.**  
*festiva* (Distant, 1907), **comb. n.**  
*marshalli* (Distant, 1911), **comb. n.**
- Myopsalta* **gen. n.**  
*atrata* (Goding & Froggatt, 1904),  
**comb. n.**  
*binotata* (Goding & Froggatt, 1904),  
**comb. n.**  
*crucifera* (Ashton, 1912), **comb. n.**  
*lactea* (Distant, 1905), **comb. n.**  
*mackinlayi* (Distant, 1882), **comb. n.**  
*waterhousei* (Distant, 1905), **comb. n.**  
*wollomombii* (Coombs, 1995), **comb. n.**
- Noongara* **gen. n.**  
*issoides* (Distant, 1905), **comb. n.**
- Froggattoides* Distant, 1910  
*pallidus* (Ashton, 1912)  
*typicus* Distant, 1910
- Clinata* **gen. n.**  
*nodicosta* (Goding & Froggatt, 1904), **comb. n.**
- Toxala* **gen. n.**  
*verna* (Distant, 1912c), **comb. n.**
- Platypsalta* **gen. n.**  
*dubia* (Goding & Froggatt, 1904),  
**comb. n.**  
*mixta* (Distant, 1914), **comb. n.**
- Drymopsalta* Ewart, 2005  
*crepitum* Ewart, 2005  
*daemeli* (Distant, 1905)
- Crotopsalta* Ewart, 2005  
*fronsecetes* Ewart, 2005  
*leptotigris* Ewart, 2009

*plexis* Ewart, 2005  
*poaecetes* Ewart, 2005  
*strenulum* Ewart, 2005  
*Ewartia* **gen. n.**  
*brevis* (Ashton, 1912), **comb. n.**  
*cuensis* (Distant, 1913), **comb. n.**  
*oldfieldi* (Distant, 1883), **comb. n.**

Tribe CHLOROCYSTINI Distant, 1905  
*Venustria* Goding & Froggatt, 1904  
*superba* Goding and Froggatt, 1904  
*Guineapsaltria* de Boer, 1993  
*flava* (Goding and Froggatt), 1904  
*Gymnotympana* Stål, 1861  
*rufa* (Ashton, 1914)

*varicolor* (Distant, 1907)  
*Owra* Ashton, 1912  
*insignis* Ashton, 1912  
*Chlorocysta* Westwood, 1851  
*fumea* (Ashton, 1914)  
*suffusa* (Distant, 1907)  
*vitripennis* (Westwood, 1851)  
*Glaucopsaltria* Goding & Froggatt, 1904  
*viridis* Goding & Froggatt, 1904  
*Thaumastopsaltria* Kirkaldy, 1900  
*globosa* (Distant, 1897)  
*Cystosoma* Westwood, 1842  
*saundersii* Westwood, 1842  
*schmeltzi*, Distant, 1882  
*Cystopsaltria* Goding & Froggatt, 1904  
*immaculata* Goding & Froggatt, 1904

## KEY TO FAMILIES AND SUBFAMILIES OF CICADOIDEA

Modified from Moulds (2005a). Some characters used in the key were selected because they seemed the best for separating taxa; not because they necessarily defined monophyletic groups. Thus, subfamily Cicadinae falls out in two locations within the key.

1. Pronotum greatly expanded and concealing majority of mesonotum . . . . . family **TETTIGARCTIDAE**  
 – Pronotum not expanded over mesonotum, much smaller than mesonotum . . . . . family **CICADIDAE** . . . 2
2. Fore wing veins CuP and 1A fused; hind wing veins RP and M fused at their bases . . . . . 3  
 – Fore wing veins CuP and 1A unfused; hind wing veins RP and M unfused at their bases . . . . .  
 . . . . . subfamily **TETTIGADINAE** (not present in Australia)
3. Metanotum entirely concealed at dorsal midline; males usually (but not always) with obvious timbal covers . . . . .  
 . . . . . subfamily **CICADINAE**  
 – Metanotum partly visible at dorsal midline; males without obvious timbal covers . . . . . 4
4. Hind wing 1st cubital cell width at distal end much greater than 2nd cubital cell (twice or more) . . . . .  
 . . . . . subfamily **CICADETTINAE**  
 – Hind wing 1st cubital cell width at distal end about equal to 2nd cubital cell . . . . . subfamily **CICADINAE**

## KEY TO TRIBES OF AUSTRALIAN CICADINAE

Modified from Moulds (2008a). Some characters used here for distinguishing Australian tribes may not be applicable to some non-Australian species belonging to these tribes. Some characters used in the key were selected because they seemed the best for separating taxa; not because they necessarily defined monophyletic groups.

1. Head with vertex very wide so that supra-antennal plate clearly reaches less than half way to eye . . . . . 2  
 – Head with vertex of average width or narrow so that the supra-antennal plate reaches at least half way to eye . . . . . 7
2. Epimeral lobe not reaching operculum . . . . . **Burbungini**  
 – Epimeral lobe reaching operculum . . . . . 3
3. Fore leg femoral primary spine lying flat, prostrate . . . . . 4  
 – Fore leg femoral primary spine erect . . . . . 5
4. Paranotum (lateral margin of pronotal collar) dilated horizontally; male timbal cover reaching, or almost reaching, metathorax  
 . . . . . **Platypleurini**  
 – Paranotum not dilated horizontally; male timbal cover only reaching about half way to metathorax . . . . . **Talcopsaltriini**

5.	Male . . . . .	6
–	Female . . . . .	<b>Cryptotympanini or Thophini</b>
6.	Timbal covers flat . . . . .	<b>Cryptotympanini</b>
–	Timbal covers inflated, sac-like . . . . .	<b>Thophini</b>
7.	Pronotal collar with a single mid-lateral tooth; male opercula (of Australian species) very long, covering some 2/3 length of abdomen . . . . .	Tribe <b>Cicadini</b> , subtribe <b>Cosmopsaltriina</b>
–	Pronotal collar with lateral margin (paranotum) smooth; male opercula extending no further than distal margin of tympanal cavity . . . . .	8
8.	Head considerably less than width of pronotum; fore wing veins C and R + Sc widely separated . . . . .	<b>Cyclochilini</b>
–	Head about as wide as pronotum; fore wing veins C and R + Sc abutted for their length . . . . .	9
9.	Lateral ocelli widely separated, the distance between them about equal to the distance between each lateral ocellus and eye . . . . .	<b>Jassopsaltriini</b>
–	Lateral ocelli closely spaced, the distance between them considerably less than the distance between each lateral ocellus and eye . . . . .	10
10.	Distance between eyes less than distance between paramedian fissures of pronotum . . . . .	<b>Tamasini</b>
–	Distance between eyes greater than distance between paramedian fissures of pronotum . . . . .	<b>Burbungini</b>

## KEY TO THE TRIBES OF AUSTRALIAN CICADETTINAE

Adopted from Moulds (2005a). Some characters used here for distinguishing Australian tribes may not be applicable to some non-Australian species belonging to these tribes.

1.	Fore wing veins M and CuA meeting the basal cells with their stems confluent . . . . .	<b>Cicadettini</b>
–	Fore wing veins M and CuA meeting the basal cell clearly separated . . . . .	2
2.	Fore wing with 9 or more apical cells . . . . .	3
–	Fore wing with 8 apical cells . . . . .	4
3.	Head narrower than maximum width of pronotum . . . . .	<b>Chlorocystini</b>
–	Head wider than maximum width of pronotum . . . . .	<b>Taphurini</b> , subtribe <b>Tryellina</b>
4.	Fore wing costa broadest near node . . . . .	<b>Chlorocystini</b>
–	Fore wing costa not broadest near node, tending to be parallel-sided . . . . .	5
5.	Hind wing veins CuP and 1A fused in part . . . . .	<b>Prasiini</b>
–	Hind wing veins CuP and 1A unfused . . . . .	6
6.	Male . . . . .	7
–	Female . . . . .	<b>Cicadettini</b> or <b>Taphurini</b> , subtribe <b>Tryellina</b>
7.	Opercula within confines of tympanal cavity . . . . .	<b>Cicadettini</b>
–	Opercula extending distally beyond tympanal cavity . . . . .	<b>Taphurini</b> , subtribe <b>Tryellina</b>

## KEY TO GENERA OF AUSTRALIAN CICAIDOIDEA

PLEASE NOTE: A number of features used in this key are not clearly visible to the naked eye and examination of specimens at magnification is recommended. Specimens are best viewed with the wings spread and when there is a choice between sexes it is usually best to use a male because identification of females often requires additional steps. This key is designed to provide identification to genus for all *described* Australian species; it may not work for undescribed species and it is recommended that identifications obtain from this key be verified using the generic descriptions and figures below.

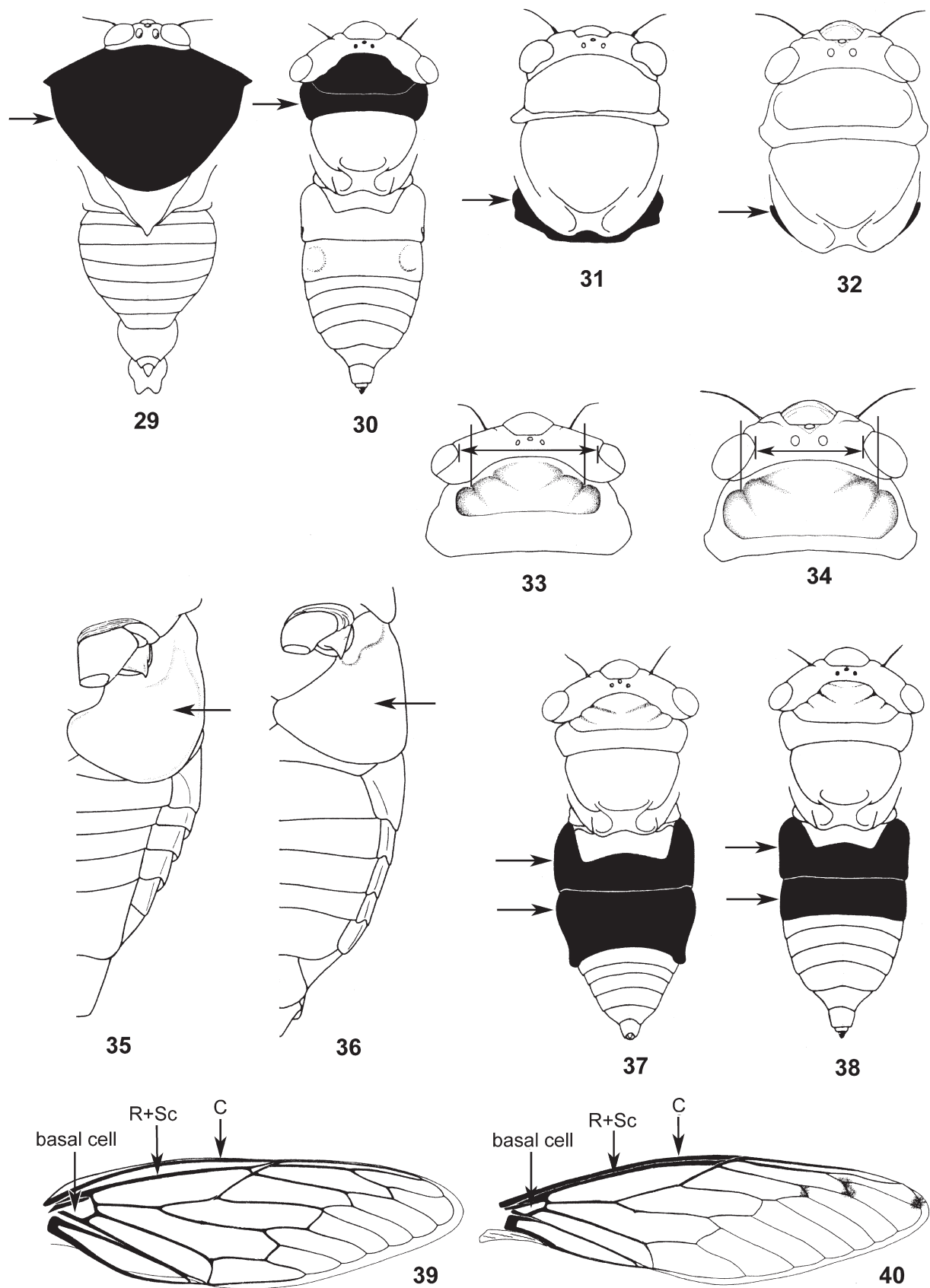


Although the key appears long most specimens will key out in less than 12 steps. The key is constructed as a practical means of identification and does not necessarily use true generic characters or reflect phylogenetic relationships. It attempts to include all variant specimens. Wherever possible external features have been used, including colour, but in a few cases it has been necessary to use male genitalic features requiring dissection. Species are identified directly to genus, avoiding the need for keys to tribes.

1.	Pronotum greatly expanded and concealing most of mesonotum (Fig. 29) (family Tettigarctidae) . . . . .	<b><i>Tettigarcta</i></b>
–	Pronotum not expanded over mesonotum, much smaller than mesonotum (Fig. 30) (family Cicadidae) . . . . .	2
2.	Metanotum partly visible (as a ridged structure) at dorsal midline (Fig. 31) (includes <i>most</i> small cicadas; subfamily Cicadettinae) . . . . .	45
–	Metanotum concealed on dorsal midline (Fig. 32) (includes <i>most</i> large cicadas; subfamily Cicadinae) . . . . .	3
3.	Distance between eyes clearly greater than distance between lateral fissures of pronotum (Fig. 33) . . . . .	4
–	Distance between eyes <i>not</i> wider than distance between lateral fissures of pronotum (Fig. 34) . . . . .	20
4.	Male . . . . .	5
–	Female . . . . .	12
5.	Timbal covers greatly swollen, sac-like . . . . .	<b><i>Thopha</i></b>
–	Timbal covers flat, nearly confluent with abdomen . . . . .	6
6.	Operculum with distal margin evenly rounded in an arc (Fig. 35) . . . . .	7
–	Operculum angular, the lateral and distal margins both nearly straight (Fig. 36) . . . . .	11
7.	Viewed ventrally, supra-antennal plate curved under head so that rim is clearly positioned on ventral side of head . . . . .	10
–	Viewed ventrally, supra-antennal plate is not curved under head so that rim is always aligned with anterior margin of vertex . . . . .	8
8.	Pronotal collar very broad, nearly as wide as diameter of eyes, and well developed laterally . . . . .	<b><i>Macrotristria</i></b>
–	Pronotal collar nowhere near as wide as diameter of eyes and very narrow laterally . . . . .	9
9.	Timbal covers well developed and completely concealing timbals . . . . .	<b><i>Arenopsaltria</i></b>
–	Timbal covers reduced and clearly exposing part of timbals . . . . .	<b><i>Burbunga</i></b>
10.	Hind wing anal lobe entirely and boldly suffused orange (indistinct if wings are folded) . . . . .	<b><i>Anapsaltoda</i></b>
–	Hind wing anal lobe substantially hyaline or if hints of orange then very weak . . . . .	<b><i>Macrotristria</i></b>
11.	Tergites 2 and 3 highly modified, enlarged and comprising some 2/3 of abdominal length (Fig. 37). . . . .	<b><i>Neopsaltoda</i> (<i>N. crassa</i>)</b>
–	Tergites 2 and 3 enlarged but forming only about half abdominal length (Fig. 38) . . . . .	<b><i>Psaltoda</i></b>
12.	<u>Hind</u> wing with a distinct infuscation along part of ambient vein, usually most pronounced in apical region . . . . .	13
–	Hind wing lacking infuscation on ambient vein . . . . .	15
13.	Pronotal collar with lateral part possessing a narrowed anterior extension . . . . .	<b><i>Macrotristria</i></b>
–	Pronotal collar with lateral part engulfed by the rounded lateral angles so that there is no narrow anterior extension . . . . .	14
14.	Hind wing anal lobe entirely and boldly suffused orange (indistinct if wings are folded) . . . . .	<b><i>Anapsaltoda</i></b>
–	Hind wing anal lobe substantially hyaline or if hints of orange then very weak . . . . .	<b><i>Psaltoda</i></b>
15.	<u>Fore</u> wing median veins with infuscation, often as a row of spots one per vein . . . . .	16
–	Fore wing median veins lacking infuscation . . . . .	17
16.	Pronotal collar very broad, nearly as wide as diameter of eyes, and well developed laterally . . . . .	<b><i>Macrotristria</i></b>
–	Pronotal collar nowhere near as wide as diameter of eyes and very narrow laterally . . . . .	<b><i>Arenopsaltria</i></b>
17.	Fore wing basal cell entirely black . . . . .	<b><i>Burbunga</i></b>
–	Fore wing basal cell never entirely black . . . . .	18
18.	Abdominal segment 8 in dorsal view clearly distinguished by a covering of white (powder-like) or silver pubescence . . . . .	<b><i>Thopha</i></b>
–	Abdominal segment 8 not distinguished by such pubescence . . . . .	19

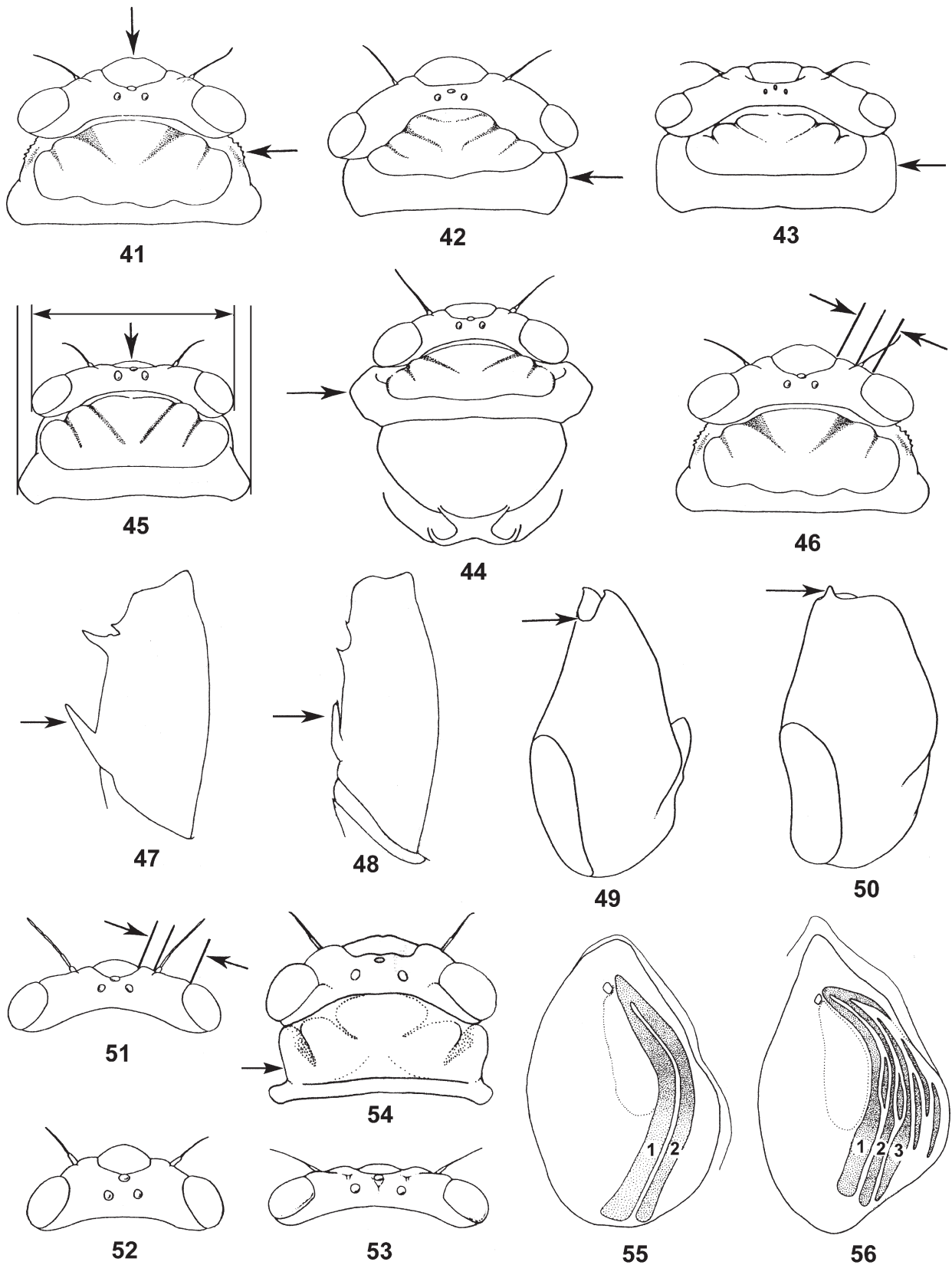
19.	Pronotal collar with lateral parts possessing a narrowed anterior extension. ....	<b>Macrotristria</b>
–	Pronotal collar with lateral parts engulfed by the rounded lateral angles so that there is no narrow anterior extension . . . . .	<b>Neopsaltoda</b> (McIlwraith Rg only) or <b>Psaltoda</b>
20.	Fore wing basal cell broad and about as wide as long or just a little elongate (Fig. 39); basal cell opaque along anterior margin or more extensively . . . . .	21
–	Fore wing basal cell slender, clearly longer than wide (Fig. 40); basal cell largely translucent, never partly opaque . . . . .	40
21.	Fore wing costal veins C and R+Sc widely separated, the area between them entirely flat (Fig. 39); pronotal collar exceedingly broad including lateral margins . . . . .	<b>Cyclochila</b>
–	C and R+Sc adjacent with no flat area between (Fig. 40); pronotal collar never exceedingly broad <u>both</u> dorsally and laterally . . . . .	22
22.	Fore leg femoral primary spine lying flat against femur, prostrate (Fig. 48) . . . . .	23
–	Fore leg femoral primary spine erect (Fig. 47) . . . . .	25
23.	Paranota (lateral margins of pronotal collar) very ampliate, shelf-like (Fig. 44) (a species confined to Christmas Island) . . . . .	<b>Oxypleura</b> ( <i>O. calypso</i> )
–	Paranota ampliate but much reduced and almost confluent with pronotum . . . . .	24
24.	Paranotum (lateral margin of pronotal collar) bearing many very small spine-like bristles (clearly visible at x10 magnification) . . . . .	<b>Talcopsaltria</b> ( <i>T. olivei</i> , Pl. 1)
–	Paranotum lacking spine-like bristles . . . . .	<b>Burbunga</b>
25.	Paranotum (lateral margin of pronotal collar) finely serrate (Fig. 41) . . . . .	26
–	Paranotum smooth (Fig. 42) . . . . .	27
26.	Fore wing less than 35 mm in length; male timbal covers substantially overlap the opercula . . . . .	<b>Arenopsaltria</b>
–	Fore wing greater than 35 mm in length; male timbal covers often meet but never overlap the opercula . . . . .	<b>Henicopsaltria</b>
27.	Postclypeus anterior profile in dorsal view nearly straight giving the head a very blunt appearance (Fig. 45); male timbal covers greatly swollen, sac-like . . . . .	<b>Arunta</b>
–	Postclypeus anterior profile in dorsal view well rounded giving the head an angular appearance (Fig. 41); male timbal covers flat, nearly confluent with abdomen . . . . .	28
28.	Viewed ventrally, supra-antennal plate curved under head so that rim is clearly positioned on ventral side of head . . . . .	29
–	Viewed ventrally, supra-antennal plate is not curved under head so that rim is always aligned with anterior margin of vertex . . . . .	30
29.	Pronotal collar across dorsal region narrow, very much narrower than diameter of eye . . . . .	<b>Henicopsaltria</b>
–	Pronotal collar across dorsal region wide, about as wide or wider than diameter of eye . . . . .	<b>Macrotristria</b>
30.	Thorax above black or almost so, without distinct markings . . . . .	<b>Burbunga</b>
–	Thorax not coloured as above, if dark then with some obvious markings . . . . .	31
31.	Fore wings with infuscations . . . . .	32
–	Fore wings lacking infuscations . . . . .	38
32.	Distance between supra-antennal plate and eye (in dorsal view), about equal to length of antennal plate (Fig. 46) . . . . .	33
–	Distance between supra-antennal plate and eye (in dorsal view), clearly greater than length of antennal plate (Fig. 51) . . . . .	37
33.	Male pygofer with no median dorsal beak (or a very small one) set between protruding distal shoulders (Fig. 49); female with ampliate costal margin (shelf-like anterior expansion) clearly its widest in vicinity of basal cell . . . . .	<b>Illyria</b>
–	Male pygofer with a median dorsal beak that is exposed and the most distal part of pygofer (Fig. 50); female with ampliate costal margin no wider in vicinity of basal cell than elsewhere . . . . .	34
34.	Rostrum exceedingly long, extending way beyond distal ends of hind coxae . . . . .	35
–	Rostrum much shorter, reaching no further than about bases of hind coxae . . . . .	36
35.	Large cicadas with fore wing length 35 mm or more . . . . .	<b>Henicopsaltria</b>
–	Medium size cicadas with fore wing length no more than 30 mm . . . . .	<b>Parnquila</b> gen. n. ( <i>P. unicolor</i> )
36.	Distance between lateral ocelli about equal to distance from lateral ocellus to eye . . . . .	<b>Parnquila</b> gen. n.
–	Distance between lateral ocelli much less than distance from lateral ocellus to eye . . . . .	<b>Burbunga</b> ( <i>B. albofasciata</i> )





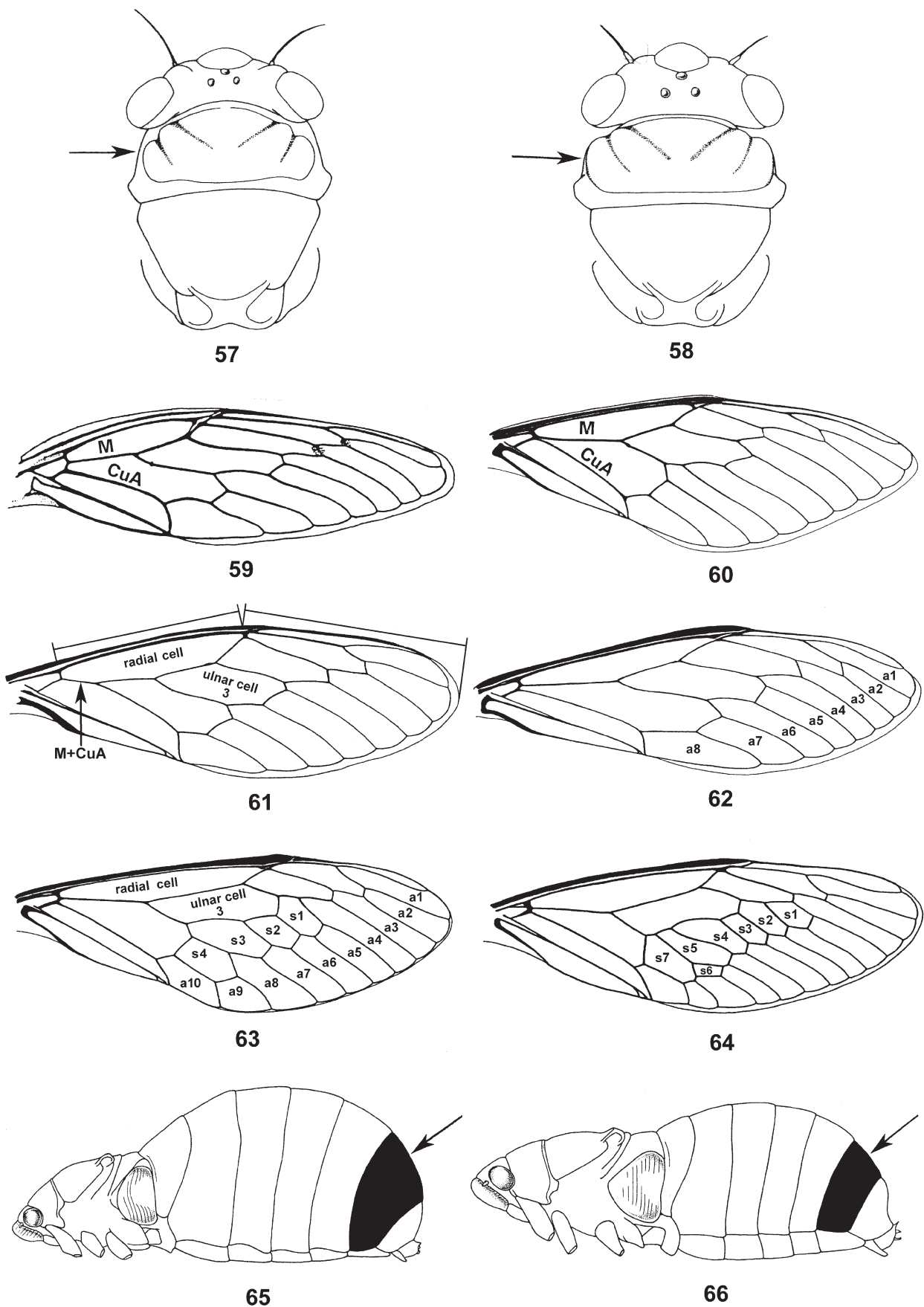
**FIGURES 29–40.** Diagrams accompanying key to genera: (29–30) head and body, dorsal view with pronotum highlighted black; (31–32) head and thorax, dorsal view with metanotum highlighted black; (33–34) head and pronotum, dorsal view with pronotal fissures indicated; (35–36) posterior of male thorax plus abdomen, ventral view; (37–38) male head and abdomen, dorsal view with abdominal tergites 2 and 3 highlighted black; (39–40) right fore wing.

37.	Fore wing less than 35 mm in length; male timbal covers substantially overlap the opercula . . . . .	<i>Arenopsaltria</i>
–	Fore wing greater than 35 mm in length; male timbal covers often meet but never overlap the opercula . . . . .	<i>Henicopsaltria</i>
38.	Rostrum exceedingly long, extending far beyond apices of hind coxae . . . . .	39
–	Rostrum shorter, reaching no further than apices of hind coxae . . . . .	<i>Burbunga</i>
39.	Thorax mid brown and boldly patterned with jet black fascia . . . . .	<i>Henicopsaltria</i>
–	Thorax very dark reddish brown and largely unmarked . . . . .	<i>Burbunga</i>
40(20).	Paranotum (lateral margin of pronotal collar) with a small tooth near mid point . . . . .	<i>Diceropyga</i> ( <i>D. subapicalis</i> )
–	Paranotum lacking such a tooth . . . . .	41
41.	Distance between all three ocelli about equal (Fig. 52) . . . . .	42
–	Distance between the lateral ocelli much greater than distance between anterior ocellus and each lateral ocellus (Fig. 53) . . . . .	44
42.	Paranota (lateral margins of pronotal collar) ampliate (Fig. 57) . . . . .	<i>Tamasa</i>
–	Paranota virtually confluent with surface of pronotum (Fig. 58) . . . . .	43
43.	Fore wing length less than 20 mm; male timbal covers undeveloped, apparently absent . . . . .	<i>Parnkalla</i> ( <i>P. muelleri</i> )
–	Fore wing length longer than 20 mm; male timbal covers clearly developed but covering only about half timbal cavity . . . . .	<i>Parnquila</i> gen. n.
44.	Fore wing with infuscations . . . . .	<i>Parnquila</i> gen. n. ( <i>P. magna</i> , Pl. 1)
–	Fore wing entirely without infuscation . . . . .	<i>Jassopsaltria</i>
45(2).	Fore wing veins M and CuA meeting basal cell independently, usually clearly separated (Fig. 59) but sometimes abutted (Fig. 60) (if one wing has these veins completely fused as one but the other not, then treat as unfused) . . . . .	46
–	Fore wing veins M and CuA with their stems fused as one before meeting basal cell (check under magnification, sometimes abutted veins can look fused to naked eye) (Fig. 61) . . . . .	80
46.	Fore wing with 8 apical cells (Fig. 62) . . . . .	54
–	Fore wing with 9 or more apical cells (Fig. 63) (if one wing has 8 and the other 9, then treat as having 8, not 9) . . . . .	47
47.	Fore wing ulnar cell 3 substantially parallel to radial cell (Fig. 63) . . . . .	48
–	Fore wing ulnar cell 3 substantially angled to radial cell (Fig. 61) . . . . .	53
48.	Fore wing with a single row of subapical cells (Fig. 63) . . . . .	49
–	Fore wing with no subapical cells (Fig. 61) or many subapical cells (Figs 67, 68) . . . . .	51
49.	Fore wing with 10 apical cells (sometimes 9 or 11 if aberrant, but usually so only in 1 wing); 4 or 5 subapical cells (Fig. 63) . . . . .	<i>Owra</i> ( <i>O. insignis</i> )
–	Fore wing with 12 or more apical cells (sometimes 11 if aberrant, but usually so only in 1 wing); 6 or more subapical cells (Fig. 64) . . . . .	50
50.	Male tergite 7 clearly larger than others, its dorsal midline much greater in length (Fig. 65); female normally with 13 apical cells in fore wing and 6 apical cells in hind wing (aberrant specimens can have one more or one less in either but usually only in one wing) . . . . .	<i>Glaucopsaltria</i> ( <i>G. viridis</i> )
–	Male tergite 7 similar in size to others (Fig. 66); female normally with 12 apical cells in fore wing and 5 apical cells in hind wing (aberrant specimens can have one more or one less in either but usually so only in one wing) . . . . .	<i>Chlorocysta</i>
51(48).	Fore wing hyaline . . . . .	<i>Thaumastopsaltria</i> ( <i>T. globosa</i> )
–	Fore wing entirely opaque and coloured green, orange or turquoise . . . . .	52
52.	Fore wing with majority of marginal cells long and slender, at least three times longer than wide (Fig. 67) . . . . .	<i>Cystopsaltria</i>
–	Fore wing with only a few marginal cells reaching three times longer than wide, majority much less (Fig. 68) . . . . .	<i>Cystosoma</i>
53(47).	Fore wing veins M and CuA meeting basal cell wide apart (Fig. 69); fore wing normally with 10 apical cells (9 or 11 if aberrant but usually so only in one wing) (Fig. 69) . . . . .	<i>Pictila</i> gen. n. ( <i>P. occidentalis</i> , Pl. 1)
–	Fore wing veins M and CuA meeting basal cell abutted or nearly so (Fig. 70); fore wing with 9 apical cells (Fig. 70) . . . . .	<i>Venustria</i> ( <i>V. superba</i> )



**FIGURES 41–56.** Diagrams accompanying key to genera: (41–46, 51–54) head or head plus pronotum, dorsal view; (47–48) fore femur; (49–50) male pygofer, dorso-lateral view; (55–56) right timbal (anterior to right).

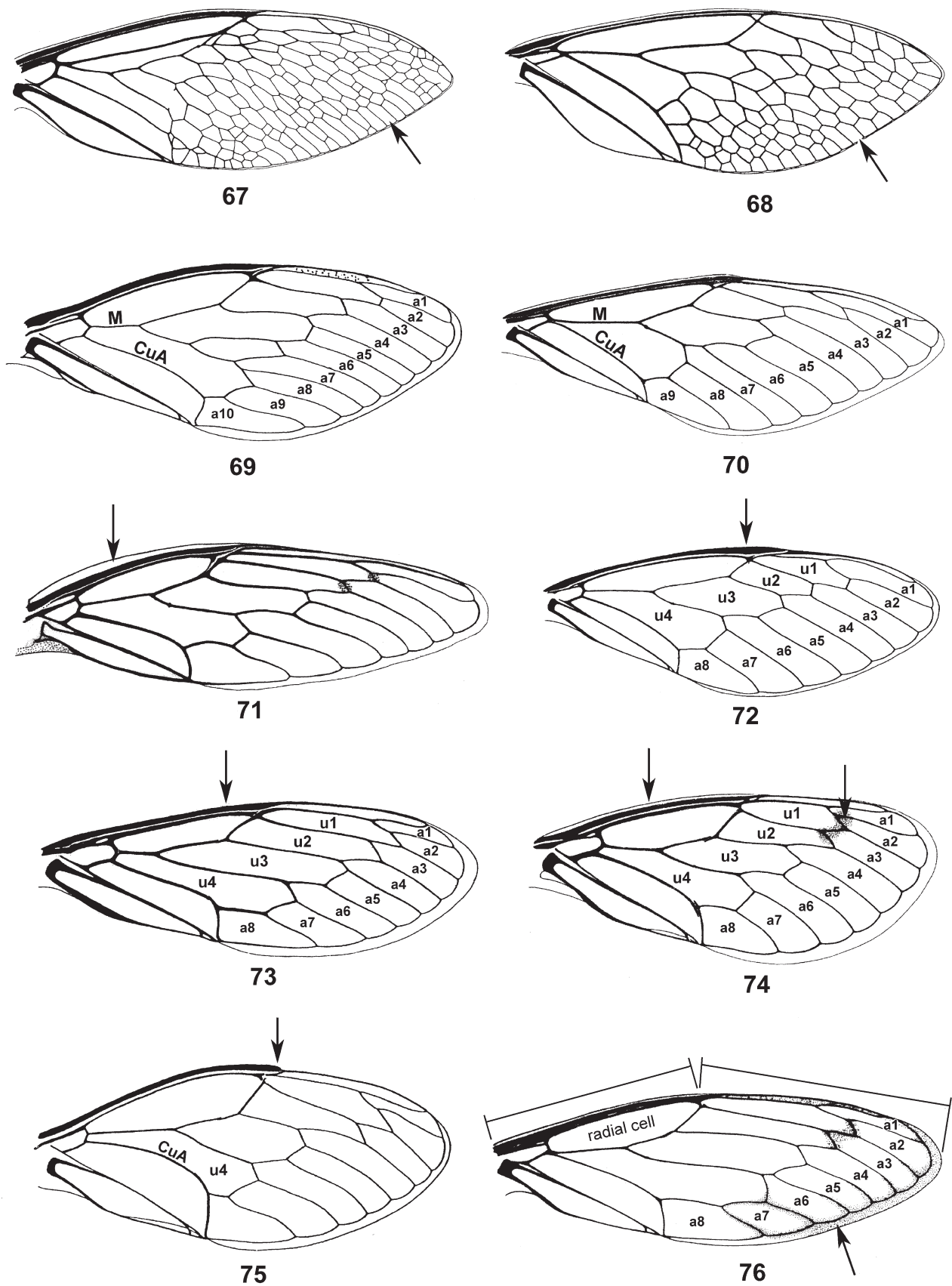
54(46).	Fore wing with sclerotized area (shelf-like) anterior to costal vein very wide, the maximum width at least as wide as costal vein (Fig. 71) . . . . .	55
–	Fore wing with sclerotized area (shelf-like) anterior to costal vein either clearly less than width of costal vein (Fig. 74) or absent (Fig. 72) . . . . .	56
55.	Fore wing rarely shorter than 32 mm long, often above 40 mm; male genitalia with uncal lobes downturned at their distal ends . . . . .	<i>Aleeta</i> ( <i>A. curvicosta</i> )
–	Fore wing never as long as 32 mm, usually under 26 mm; uncal lobes upturned at their distal ends . . . . .	<i>Tryella</i>
56.	Head, thorax and abdomen green (sometimes red), virtually without markings . . . . .	57
–	Head, thorax and abdomen never all green (or red) . . . . .	63
57.	Fore wing costa broadest near node (Fig. 72); fore wing margin narrow or absent (Fig. 72) . . . . .	59
–	Fore wing costa not broadest near node, tending to be parallel-sided (Fig. 73); fore wing margin broad (Fig. 73) . . . . .	58
58.	Fore wing apical cells similar in length to ulnar cells . . . . .	<i>Erempsalta</i> gen. n.
–	Fore wing apical cells all very much shorter than any ulnar cell (Fig. 73) . . . . .	<i>Chrysocada</i> ( <i>C. franceaustrale</i> , Pl. 1)
59.	Fore wing costa red . . . . .	<i>Gymnotympana</i>
–	Fore wing costa green or yellowish green . . . . .	60
60.	Male . . . . .	61
–	Female . . . . .	62
61.	Abdomen entirely green, yellow or orange <u>below</u> . . . . .	<i>Guineapsaltria</i> ( <i>G. flava</i> )
–	Abdomen partly or entirely red <u>below</u> . . . . .	<i>Gymnotympana</i>
62.	<u>Hind</u> wing apical cell 1 with its distal end as long as, or almost as long as, apical cell 2 (Fig. 77) . . . . .	<i>Guineapsaltria</i> ( <i>G. flava</i> )
–	Hind wing apical cell 1 with its distal end clearly shorter than end of apical cell 2 (Fig. 78) . . . . .	<i>Gymnotympana</i>
63(56).	Fore wing appearing like a dead leaf, light brown or rusty brown in colour . . . . .	<i>Lembeja</i>
–	Fore wing hyaline (sometimes with infuscations) OR entirely suffused with black or brownish black . . . . .	64
64.	Fore wing with infuscation highlight overlaying veins at distal ends of ulnar cells 1 and 2 (not to be confused with darkened edges that follow <u>all</u> veins of the fore wing) (Fig. 74) . . . . .	65
–	Fore wing veins lacking infuscation highlight at distal ends of ulnar cells 1 and 2 . . . . .	72
65.	Fore wing with infuscations confined to distal ends of ulnar cells 1 and 2 (Fig. 74) . . . . .	66
–	Fore wing with infuscation also elsewhere, e.g. along ambient vein or at bases of ulnar cells 2 or 3 (Fig. 76) . . . . .	70
66.	Head, thorax and abdomen light brown, virtually without markings . . . . .	<i>Erempsalta</i> gen. n.
–	Head, thorax and abdomen usually dominantly black, sometimes brown but if so then with jet black markings on abdomen . . . . .	67
67.	Fore wing vein CuA strongly bowed forwards and substantially narrowing ulnar cell 4; leading edge of costal margin markedly stepped near node (Fig. 75) . . . . .	<i>Adelia</i> gen. n. ( <i>A. borealis</i> , Pl. 1)
–	Fore wing vein CuA nearly straight and not encroaching on ulnar cell 4; curve of leading edge of costal margin uninterrupted (Fig. 74) . . . . .	68
68.	Hind wing marginal area clearly wider than fore wing marginal area; male with a very broad abdomen that is much wider than thorax . . . . .	<i>Mugadina</i> gen. n.
–	Hind wing marginal area similar in width to fore wing marginal area; male abdomen about as wide as thorax . . . . .	69
69.	Hind wing plaga white or nearly so; postclypeus in lateral profile angular at most anterior part . . . . .	<i>Gelidea</i> gen. n. ( <i>G. torrida</i> )
–	Hind wing plaga grey, brown or black; postclypeus in lateral profile rounded at most anterior part . . . . .	<i>Diemeniana</i>
70.	Fore wing with infuscation along ambient vein (Fig. 76) . . . . .	71
–	Fore wing lacking infuscation on ambient vein . . . . .	<i>Noongara</i> gen. n. ( <i>N. issoides</i> , Pl. 2)
71.	Male abdomen about as wide as thorax; female ovipositor terminating level with end of abdomen (Fig. 103) . . . . .	<i>Kobonga</i>
–	Male abdomen much wider than thorax; female ovipositor extending beyond end of abdomen (Fig. 104) . . . . .	<i>Mugadina</i> gen. n.



**FIGURES 57–66.** Diagrams accompanying key to genera: (57–58) head and thorax, dorsal view; (59–64) right fore wing; (65–66) head and body, lateral view with abdominal tergite 7 highlighted black.

72(64).	Fore wing nearly opaque, substantially black or brown all over . . . . .	<b>Gudanga</b>
–	Fore wing hyaline, sometimes weakly tinted . . . . .	73
73.	Hind wing anal lobe narrow, no wider than the maximum width of cubital cells cuc1 + cuc2 (Fig. 79) . . . . .	74
–	Hind wing anal lobe broad, clearly wider than the maximum width of cuc1 + cuc2 (Fig. 80) . . . . .	75
74.	Hind wing apical cell 1 very small, much smaller than any other apical cell . . . . .	<b>Terepsalta gen. n.</b> ( <i>T. infans</i> , Pl. 2)
–	Hind wing apical cell 1 large, clearly not the smallest apical cell . . . . .	<b>Uradolichos gen. n.</b> ( <i>U. longipennis</i> , Pl. 2)
75.	Fore wing veins M and CuA widely separate when meeting basal cell (Fig. 81) . . . . .	<b>Marteenia</b> ( <i>M. rubricincta</i> )
–	Fore wing veins M and CuA abutted or nearly so for a portion of their length before meeting basal cell (Fig. 82) . . . . .	76
76.	Hind wing with a small infuscation at distal end of vein 2A that extends onto wing margin (Fig. 83) . . . . .	<b>Pauropsalta</b>
–	Hind wing lacking infuscation at distal end of vein 2A (Fig. 84) . . . . .	77
77.	A small cicada with fore wing less than 20 mm in length . . . . .	78
–	A much larger cicada with fore wing greater than 25 mm in length . . . . .	79
78.	Hind wing marginal area wide, clearly wider than fore wing marginal area; male with a very broad abdomen that is much wider than thorax (about 1.4x wider) . . . . .	<b>Mugadina gen. n.</b>
–	Hind wing marginal area similar in width to fore wing marginal area; male abdomen about as wide as thorax . . . . .	<b>Sylphoides gen. n.</b> ( <i>S. arenaria</i> )
79.	Primarily a tan coloured cicada . . . . .	<b>Venustria</b> ( <i>V. superba</i> )
–	Primarily a black coloured cicada . . . . .	<b>Yoyetta gen. n.</b>
80(45).	Hind wing with 3, 4 or 5 apical cells (Fig. 83) . . . . .	81
–	Hind wing with 6 or more apical cells (if one hind wing has 6 and the other 5, then treat as having 5, not 6) (Fig. 84) . . . . .	117
81.	Hind wing with an infuscation at distal end of vein 2A that extends onto wing margin (Fig. 83) . . . . .	82
–	Hind wing lacking infuscations at distal end of vein 2A (Fig. 84) . . . . .	87
82.	Male . . . . .	83
–	Female . . . . .	85
83.	Upper pygofer lobe bifurcate, the lower portion tooth-like and sharply pointed (Fig. 87) . . . . .	<b>Nanopsalta gen. n.</b> ( <i>N. basalis</i> )
–	Upper pygofer lobe undivided, large and flat (Fig. 88) . . . . .	84
84.	Abdomen broad, at its widest point much wider than lateral <i>angles</i> of pronotum . . . . .	<b>Graminitigrina</b>
–	Abdomen of more usual width, narrower than lateral <i>angles</i> of pronotum . . . . .	<b>Pauropsalta</b>
85.	Supra-antennal plate orange (viewed under magnification, approximately x12), the orange touching postclypeus <u>and</u> fore wing basal membrane orange . . . . .	<b>Nanopsalta gen. n.</b> ( <i>N. basalis</i> )
–	Supra-antennal plate <i>usually</i> not orange and <i>usually</i> not touching postclypeus <i>but if orange and if orange touching postclypeus then</i> fore wing basal membrane black . . . . .	86
86.	Apex of dorsal beak <i>not</i> the most distal part of pygofer . . . . .	<b>Pauropsalta</b>
–	Apex of dorsal beak the most distal part of pygofer . . . . .	<b>Graminitigrina</b>
87(81).	Fore wing costal vein a little thicker approaching node or before node, <u>not</u> parallel-sided (Figs 85, 86) . . . . .	88
–	Fore wing costal vein parallel-sided to node (Figs 81, 82) . . . . .	104
88.	Fore wing with fused stem of veins M and CuA short, less than length of long side of basal cell (Fig. 95) . . . . .	89
–	Fore wing with fused stem of veins M and CuA long, equal to or greater than length of long side of basal cell (Fig. 96) . . . . .	92
89.	Fore wing costal vein (C) markedly swollen proximal to node, distorting the even curvature of the costal margin (Fig. 85) . . . . .	<b>Clinata gen. n.</b> ( <i>C. nodicosta</i> , Pl. 2)
–	Fore wing costal vein gradually thickening towards node so that costal margin curves gradually (Fig. 95) . . . . .	90
90.	Fore wing radial cell clearly shorter than the distance from its apex to wing tip (Fig. 61) . . . . .	91
–	Fore wing radial cell very long, about equal to or longer than distance from its apex to wing tip . . . . .	<b>Neopunia gen. n.</b> ( <i>N. graminis</i> , Pl. 2)
91.	Distance between median ocellus and lateral ocellus about equal to or less than diameter of ocellus . . . . .	<b>Punia gen. n.</b>
–	Distance between median ocellus and lateral ocellus much greater than diameter of ocellus . . . . .	<b>Mugadina gen. n.</b>

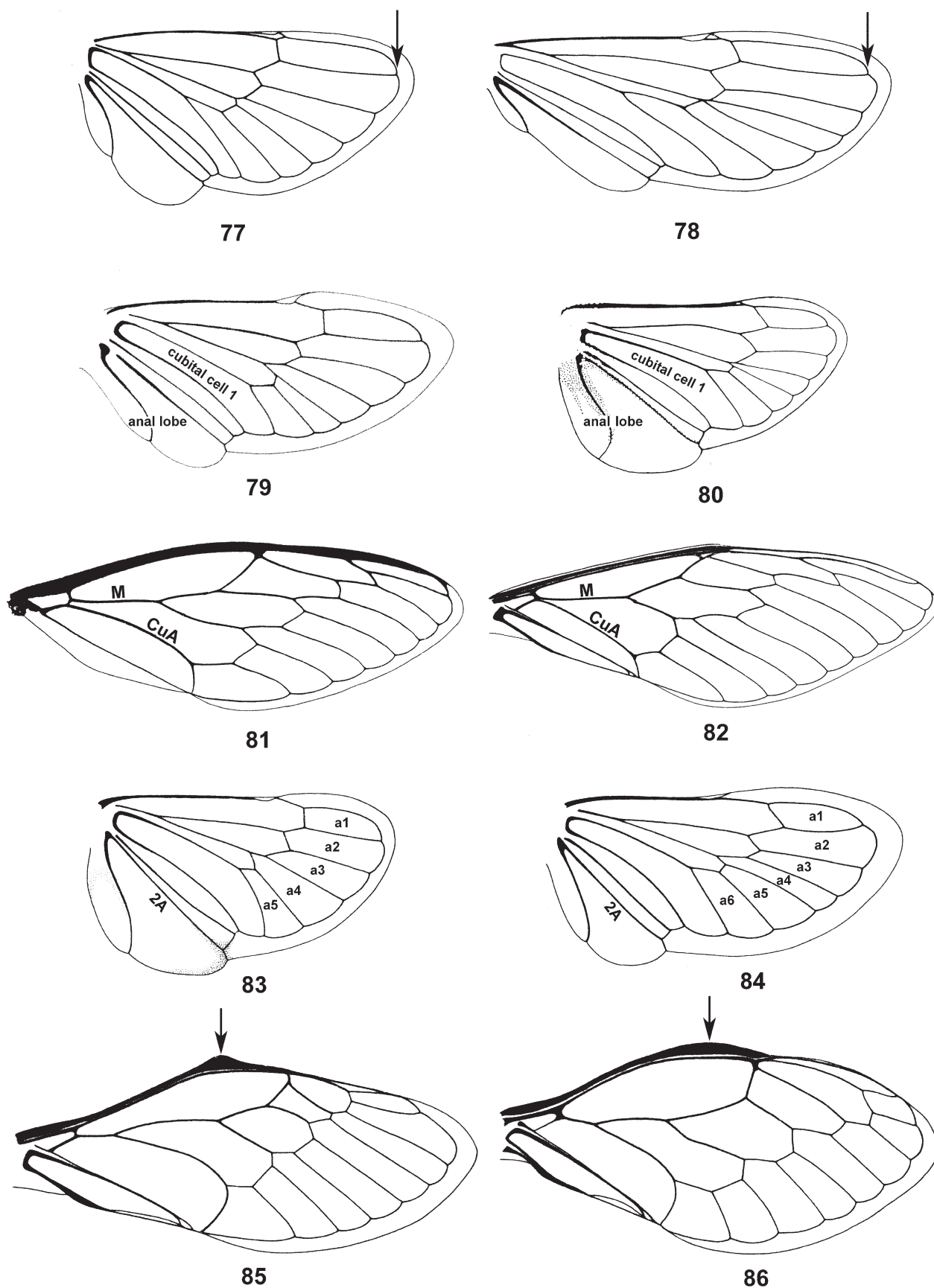




FIGURES 67–76. Diagrams accompanying key to genera: (67–76) right fore wing.

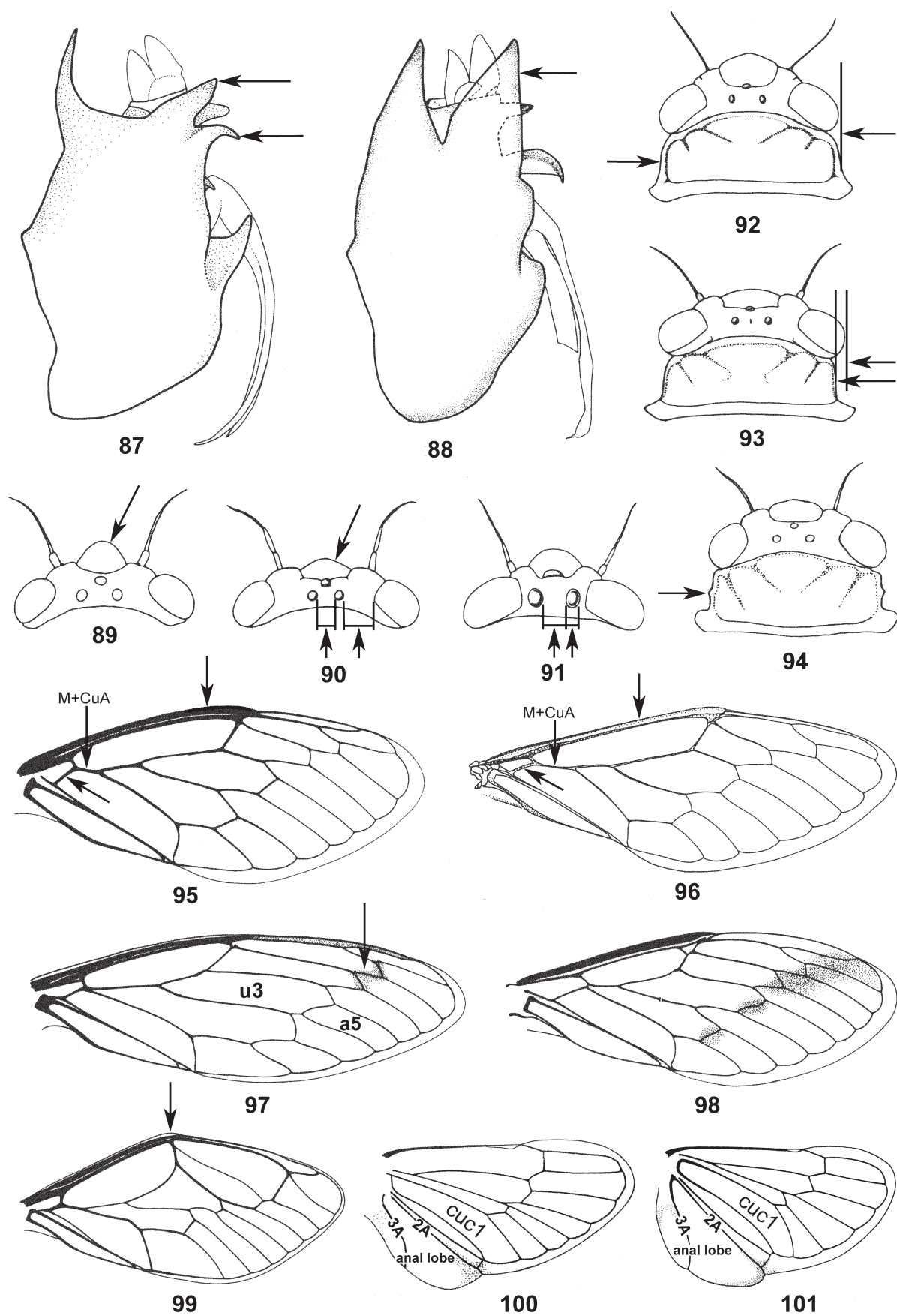
92(88).	Fore wing costa clearly bowed (Fig. 86) . . . . .	93
–	Fore wing costa barely curved, nearly straight (Figs 96, 98) . . . . .	95
93.	Pronotum dominantly black . . . . . <i>Clinata</i> gen. n. ( <i>C. nodicosta</i> , Pl. 2)	
–	Pronotum dominantly brown or greenish . . . . .	94
94.	Fore wing very broad, about 2.2–2.4 x longer than wide; hind wing <i>usually</i> with three apical cells. . . <i>Toxala</i> gen. n. ( <i>T. verna</i> )	
–	Fore wing slender, at least 2.9 x longer than wide; hind wing <i>usually</i> with five apical cells, never three . . . . . <i>Drymopsalta</i>	
95.	Width of head including eyes clearly narrower than width across lateral angles of pronotal collar . . . . .	96
–	Width of head as wide as width of lateral angles of pronotal collar . . . . . <i>Nanopsalta</i> gen. n. ( <i>N. basalis</i> )	
96.	Distance between median ocellus and lateral ocellus about equal to or less than diameter of ocellus . . . . . <i>Punia</i> gen. n.	
–	Distance between median ocellus and lateral ocellus much greater than diameter of ocellus . . . . .	97
97.	Male . . . . .	98
–	Female . . . . .	100
98.	Upper pygofer lobe a small rounded lobe . . . . .	99
–	Upper pygofer lobe very large (larger than in Fig. 88) and expanded apically . . . . . <i>Graminitigrina</i>	
99.	Abdominal segment 3 narrower than abdominal segment 2 including auditory capsules . . . . . <i>Paradina</i> gen. n. ( <i>P. leichardti</i> , Pl. 2)	
–	Abdominal segment 3 at least as wide as abdominal segment 2 . . . . . <i>Mugadina</i> gen. n.	
100.	Fore wing with infuscations . . . . .	101
–	Fore wing lacking infuscations . . . . .	102
101.	Bold infuscation along entire length of ambient vein . . . . . <i>Mugadina</i> gen. n.	
–	Infuscation mostly as an apical suffusion . . . . . <i>Graminitigrina</i>	
102.	Dome of cruciform elevation glossy jet black . . . . . <i>Mugadina</i> gen. n.	
–	Dome of cruciform elevation dull yellow, sometimes muddled with black but never glossy black . . . . .	103
103.	Pronotum dominantly black . . . . . <i>Graminitigrina</i>	
–	Pronotum light brown with some black markings . . . . . <i>Mugadina</i> gen. n. or <i>Paradina</i> gen. n. ( <i>P. leichardti</i> , Pl. 2)	
104(87).	Postclypeus large, in dorsal view protruding and not confluent with front margin of head (Fig. 89) but excluding specimens that are green (or pale tan if discoloured) . . . . .	105
–	Postclypeus small and more or less confluent with anterior margin of head (Fig. 90) <u>or</u> green specimens (pale tan if discoloured) . . . . .	106
105.	Dark coloured cicadas with most of pronotum black; male abdomen tending parallel-sided . . . . . <i>Uradolichos</i> gen. n.	
–	Paler cicadas with pronotum not dominated by black, the black markings reduced so that pronotum dominantly brown; male abdomen tapering from abdominal segment 2 . . . . . <i>Dipsopsalta</i> gen. n. ( <i>D. signata</i> , Pl. 2)	
106.	Head including eyes as wide as, or wider than maximum width of abdomen . . . . .	107
–	Head narrower than maximum width of abdomen . . . . .	112
107.	Fore wing length above 17 mm . . . . . <i>Ewartia</i> gen. n. ( <i>E. oldfieldi</i> )	
–	Fore wing less than 17 mm . . . . .	108
108.	Fore wing basal membrane orange (Pl.2, fig. 17) . . . . . <i>Plerapsalta</i> gen. n.	
–	Fore wing basal membrane grey, brownish or blackish . . . . .	109
109.	Rostrum reaching at least to bases of hind coxae . . . . . <i>Drymopsalta</i>	
–	Rostrum reaching to about apices of mid coxae . . . . .	110
110.	Dorsal beak absent, completely straight or broadly curved across apical region . . . . . <i>Crotopsalta</i>	
–	Dorsal beak present as a developed apical spine or pointed apex (not always easy to see; magnification required) . . . . .	111
111.	Thorax and abdomen almost entirely black (Pl. 2, fig. 8) . . . . . <i>Platypsalta</i> gen. n.	
–	Thorax and abdomen <u>not</u> dominantly black (Pl.2, figs 13a,b) . . . . . <i>Paradina</i> gen. n.	





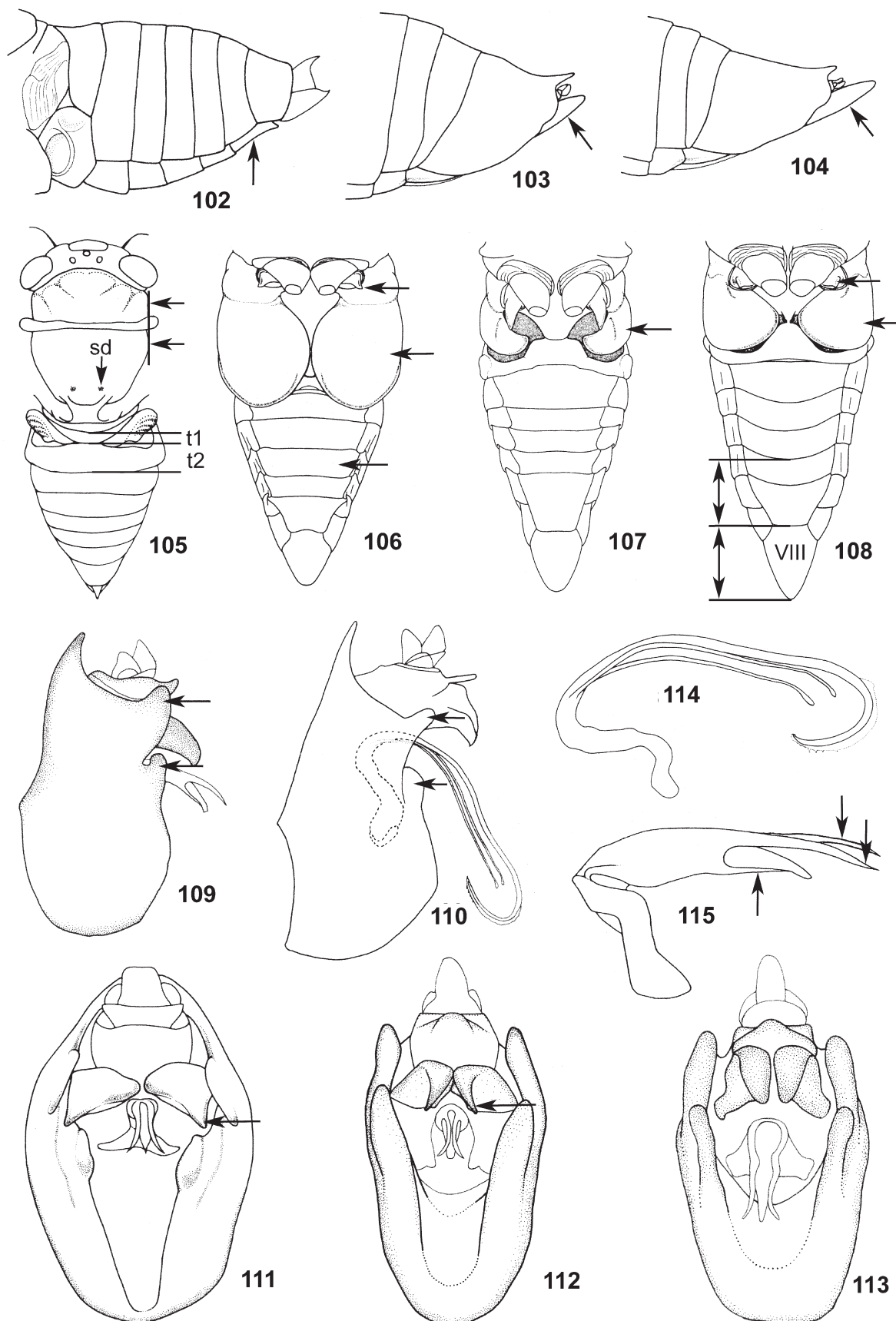
**FIGURES 77–86.** Diagrams accompanying key to genera: (77–78, 81–82, 85–86) right fore wing; (79–80, 83–84) right hind wing.

112.	Abdomen above entirely green but if discolored then yellowish or tan . . . . .	114
–	Abdomen above not usually green (or yellowish or tan) but if so then with some obvious black markings . . . . .	113
113.	Abdominal segment 3 narrower than abdominal segment 2 including auditory capsules . . . . .	<i>Paradina</i> gen. n. ( <i>P. leichardi</i> , Pl. 2)
–	Abdominal segment 3 at least as wide as abdominal segment 2 . . . . .	<i>Mugadina</i> gen. n.
114.	Male . . . . .	115
–	Female . . . . .	116
115.	Timbal plate large, occupying about three quarters of timbal membrane; two long ribs spanning the full height of the timbal (Fig. 55) . . . . .	<i>Urabunana</i>
–	Timbal plate of more usual size, occupying no more than half timbal membrane; three long ribs spanning the full height of the timbal (Fig. 56) . . . . .	<i>Pipilopsalta</i>
116.	Width of head including eyes about as wide or wider than lateral angles of pronotal collar . . . . .	<i>Urabunana</i>
–	Width of head including eyes clearly narrower than lateral angles of pronotal collar . . . . .	<i>Pipilopsalta</i>
117(80).	Fore wing with distinct infuscations . . . . .	118
–	Fore wing lacking infuscations . . . . .	132
118.	Infuscations confined to distal ends of ulnar cells 1 and 2 and sometimes also at wing tip (Fig. 97) . . . . .	119
–	Infuscations also elsewhere, e.g. along ambient vein or at distal ends of ulnar cells 2 or 3 (Figs 76, 98) . . . . .	126
119.	Head, thorax and abdomen entirely green or light tan, virtually without markings (Pl. 1, fig 6) . . . . .	<i>Erempsalta</i> gen. n.
–	Head, thorax and abdomen never all green or light tan . . . . .	120
120.	Hind wing marginal area clearly wider than fore wing marginal area; male with a very broad abdomen that is much wider than thorax . . . . .	<i>Mugadina</i> gen. n.
–	Hind wing marginal area similar in width to fore wing marginal area; male abdomen about as wide as thorax . . . . .	121
121.	Head narrow, width across eyes clearly less than width of mesonotum between wings . . . . .	<i>Physeema</i> gen. n. ( <i>P. convergens</i> )
–	Head similar in width to mesonotum . . . . .	122
122.	Hind wing plaga clearly white (with no brown impurity) . . . . .	<i>Gelidea</i> gen. n. ( <i>G. torrida</i> )
–	Hind wing plaga brown or a mixture of white and brown . . . . .	123
123.	Fore wing basal membrane orange or orange brown . . . . .	124
–	Fore wing basal membrane grey or black, rarely with a slight brownish tinge . . . . .	<i>Kobonga</i>
124.	Paranotum (lateral margin of pronotum) with a midlateral tooth . . . . .	125
–	Paranotum (lateral margin of pronotum) lacking a midlateral tooth . . . . .	<i>Chelapsalta</i> gen. n. ( <i>C. puer</i> , Pl. 2)
125.	Hind wing anal lobe with much of its distal margin straight; apical cell 3 <i>usually</i> much shorter than apical cell 4 (just over half its length) . . . . .	<i>Galanga</i> gen. n. ( <i>G. labeculata</i> )
–	Hind wing anal lobe with much of its distal margin curved; apical cell 3 just a littler shorter than apical cell 4, never approaching half its length . . . . .	<i>Clinopsalta</i> gen. n.
126(118).	Infuscation present along much of ambient vein (Fig. 76) . . . . .	127
–	Infuscation <u>not</u> present along ambient vein (Fig. 98) . . . . .	<i>Noongara</i> gen. n. ( <i>N. issoides</i> , Pl. 2)
127.	Fore wing membrane hyaline beyond infuscations, just as clear as hind wing . . . . .	<i>Kobonga</i>
–	Fore wing membrane weakly tinted brown, slightly darker than hind wing . . . . .	<i>Myopsalta</i> gen. n.
128.	Male . . . . .	129
–	Female . . . . .	130
129.	Male abdomen about as wide as thorax . . . . .	<i>Kobonga</i>
–	Male abdomen much wider than thorax . . . . .	<i>Mugadina</i> gen. n.
130.	Ovipositor terminating level with end of abdomen (Fig. 103) . . . . .	<i>Kobonga</i>
–	Ovipositor extending beyond end of abdomen (Fig. 104) . . . . .	131



**FIGURES 87–101.** Diagrams accompanying key to genera: (87–88) male genitalia, lateral view; (89–94) head or head plus pronotum; (95–99) right fore wing; (100–101) right hind wing.

131.	Ulnar cells much longer than apical cells (Fig. 76) . . . . .	<i>Kobonga</i>
–	Ulnar cells about as long as apical cells (Fig. 74) . . . . .	<i>Mugadina</i> gen. n.
132(117).	Head narrow with distance between lateral ocellus and eye less than diameter of ocellus (Fig. 91); fore wing with anterior margin distinctly angled at node (Fig. 99) . . . . .	<i>Froggattoides</i>
–	Head not so narrow, the distance between lateral ocellus and eye far greater than diameter of ocellus; fore wing with anterior margin either straight or curved evenly . . . . .	133
133.	Green, tan (or if discolored, yellowish brown) cicadas, evenly coloured with very few, if any, markings; never with black markings on thorax or abdomen . . . . .	134
–	Not entirely green, tan or yellowish brown; if tending dominantly green, tan or yellowish brown then with some black markings on thorax and/or abdomen . . . . .	141
134.	Fore wing basal membrane orange, often bright orange . . . . .	135
–	Fore wing basal membrane light grey, brownish, yellowish or colourless . . . . .	138
135.	Paranotum (lateral margin of pronotal collar) when view dorsally with a mid lateral tooth or angular projection (Fig. 94) . . . . .	<i>Clinopsalta</i> gen. n.
–	Paranotum smooth, completely lacking a mid lateral tooth or angular projection (Fig. 93) . . . . .	136
136.	Scutal depressions jet black ( <i>sd</i> , Fig. 105) . . . . .	<i>Birrima</i>
–	Scutal depressions green or brown, never black . . . . .	137
137.	Head including eyes wider than mesonotum between wings . . . . .	<i>Ewartia</i> gen. n.
–	Head including eyes narrower than mesonotum between wings . . . . .	<i>Erempsalta</i> gen. n.
138.	Head including eyes narrower than lateral <u>angles</u> of pronotal collar (Fig. 45) . . . . .	139
–	Head including eyes as wide as or wider than lateral <u>angles</u> of pronotal collar . . . . .	<i>Taurella</i> gen. n.
139.	Pterostigma (pigmented area on fore wing between veins Sc and RA) pale green to pale yellowish brown . . . . .	140
–	Pterostigma dark brown to black . . . . .	<i>Samaecicada</i> ( <i>S. subolivacea</i> , Pl. 2)
140.	Distance between lateral ocelli about equal to distance between lateral ocellus and eye . . . . .	<i>Pipilopsalta</i> ( <i>P. ceuthoviridis</i> )
–	Distance between lateral ocelli clearly greater than distance between lateral ocellus and eye . . . . .	<i>Erempsalta</i> gen. n.
141(133).	<u>Hind</u> wing with a small black or grey infuscation at distal end of vein 2A that extends onto wing margin (Figs 100, 101) . . . . .	142
–	<u>Hind</u> wing lacking infuscation at distal end of vein 2A . . . . .	144
142.	Hind wing anal lobe narrow, no wider than the maximum width of cubital cells cuc1 + cuc2 (Fig. 79); pronotum usually narrowing towards posterior . . . . .	<i>Caliginopsalta</i>
–	Hind wing anal lobe broad, clearly wider than the maximum width of cuc1 + cuc2; pronotum parallel-sided or widening towards posterior, never narrowing . . . . .	143
143.	Essentially light-coloured cicadas, the males often substantially orange yellow, sometimes greenish or pale brown . . . . .	<i>Palapsalta</i> gen. n.
–	Essentially dark-coloured cicadas, often extensively black with some reddish brown . . . . .	<i>Pauropsalta</i>
144.	Paranotum (lateral margin of pronotal collar), when viewed dorsally, with a small tooth or obtusely angled around mid length (if only on one side treat as present) (Fig. 94) . . . . .	145
–	Paranotum completely lacking a tooth and not obtusely angled around mid length, instead gently and evenly curved (Fig. 92) . . . . .	159
145.	Pronotum in dorsal view gradually narrowing throughout much of its length towards posterior (Fig. 54) . . . . .	<i>Plerapsalta</i> gen. n.
–	Pronotum in dorsal view more or less parallel-sided or widening towards posterior . . . . .	146
146.	Mesonotum with a pair of nearly circular bright orange or pale yellow spots anterior of anterior arms of cruciform elevation (Pl. 1, figs 3a,b) . . . . .	<i>Clinopsalta</i> gen. n.
–	Mesonotum lacking such spots . . . . .	147
147.	Rostrum barely reaching apices of mid coxae . . . . .	148
–	Rostrum passing apices of mid coxae . . . . .	149



**FIGURES 102–115.** Diagrams accompanying key to genera: (102) male abdomen, lateral view; (103–104) distal segments of female abdomen, lateral view; (105) male head and body, dorsal view; (106–108) distal part of male thorax plus abdomen, ventral view; (109–110) male genitalia, lateral view; (111–113) male genitalia, ventral view; (114–115) aedeagus, lateral view.

148.	Cruciform elevation with lateral area between anterior and posterior arms light brown to dull yellow . . . . .	<i>Myopsalta</i> gen. n.	
–	Cruciform elevation with lateral area between anterior and posterior arms substantially black . . . . .	<i>Kobonga</i>	
149.	Male . . . . .		150
–	Female . . . . .		154
150.	Abdomen below swollen, the sternites all clearly visible in lateral profile (Fig. 102) . . . . .		151
–	Abdomen below not excessively swollen, some distal sternites not visible in lateral profile . . . . .		152
151.	Last sternite (sternite VIII) short, clearly less than the combined lengths of the two previous sternites . . . . .	<i>Physeema</i> gen. n.	
–	Last sternite (sternite VIII) long, longer than the combined lengths of the two previous sternites . . . . .	<i>Yoyetta</i> gen. n.	
152.	Abdominal tergite 1 glossy, domed and large, length when measured along dorsal midline similar to, or slightly smaller than, largest abdominal segment . . . . .	<i>Pyropsalta</i> gen. n. ( <i>P. melete</i> )	
–	Abdominal tergite 1 not glossy, flat and small, length when measured along dorsal midline similar to or slightly smaller than the largest of other abdominal segments (Fig. 105) . . . . .		153
153.	Abdominal segment 8 black or substantially so . . . . .	<i>Yoyetta</i> gen. n.	
–	Abdominal segment 8 substantially pale yellow to orange . . . . .	<i>Auscala</i> gen. n. ( <i>A. spinosa</i> )	
154.	Abdominal tergites 1–3 jet black, tergite 4 substantially orange, tergites 5–8 jet black . . . . .	<i>Pyropsalta</i> gen. n. ( <i>P. melete</i> )	
–	Abdominal tergites not so coloured . . . . .		155
155.	Rostrum very long, clearly passing apices of hind coxae . . . . .		156
–	Rostrum shorter, sometimes approaching but never reaching apices of hind coxae . . . . .		157
156.	A small cicada with fore wing length less than 20 mm . . . . .	<i>Plerapsalta</i> gen. n. ( <i>P. multifascia</i> )	
–	A larger cicada with fore wing length greater than 25 mm . . . . .	<i>Auscala</i> gen. n. ( <i>A. spinosa</i> )	
157.	Fore wing basal membrane orange . . . . .	<i>Yoyetta</i> gen. n.	
–	Fore wing basal membrane grey or whitish . . . . .		158
158.	Ovipositor sheath terminating about level with end of abdomen (Fig. 103) . . . . .	<i>Physeema</i> gen. n.	
–	Ovipositor sheath extending beyond end of abdomen (Fig. 104) . . . . .	<i>Pyropsalta</i> gen. n.	
159(144).	Fore wing radial cell clearly shorter than the distance from its apex to wing tip (Fig. 61) . . . . .		170
–	Fore wing radial cell long, about equal to or longer than the distance from its apex to wing tip . . . . .		160
160.	Pronotum mostly <u>jet</u> black (never grey black); head and abdominal markings usually orange or reddish . . . . .		161
–	Pronotum not mostly <u>jet</u> black, sometimes dark but not jet black; body markings never <u>all</u> orange or reddish . . . . .		163
161.	Fore wing basal membrane orange; opercula curved towards abdominal midline . . . . .	<i>Plerapsalta</i> gen. n.	
–	Fore wing basal membrane grey, brownish grey or blackish; opercula directed distally, not curved towards abdominal midline . . . . .		162
162.	Pronotum virtually all black across dorsal surface (known only from the Sydney region) . . . . .	<i>Samaecicada</i> ( <i>S. subolivacea</i> , Pl. 2)	
–	Pronotum black with a broad orange red or brownish orange fascia along midline . . . . .	<i>Drymopsalta</i>	
163.	Dominantly black cicadas with mesothorax and abdomen mostly black . . . . .		164
–	Not dominantly black cicadas . . . . .		167
164.	Small cicadas with a fore wing length less than 17 mm . . . . .		165
–	Larger cicadas with a fore wing length greater than 19 mm . . . . .	<i>Clinopsalta</i> gen. n. ( <i>C. adelaida</i> , Pl. 1)	
165.	<u>Hind</u> wing apical cell 1 very small, far less than half the length of apical cell 2 . . . . .	<i>Samaecicada</i> ( <i>S. subolivacea</i> , Pl. 2)	
–	Hind wing apical cell 1 no smaller than half the length of apical cell 2 . . . . .		166
166.	Fore wing unusually broad (often markedly so in males), 2.2x longer than wide or broader (Fig. 177e, Pl. 2, fig. 8) . . . . .	<i>Platypsalta</i> gen. n.	
–	Fore wing of usual proportions, about 2.6x longer than wide (Fig. 139f, Pl. 2, fig. 1) . . . . .	<i>Drymopsalta</i>	



167.	Male opercula small, narrow, sickle-shaped, clearly <u>not</u> developed around base of meracanthus (Fig. 107); female ovipositor sheath short, barely passing dorsal beak . . . . .	168
–	Male opercula broad, only vaguely sickle-shaped, developed around base of meracanthus; female ovipositor sheath long, extending a distance equal to nearly half the length of abdominal segment 9 . . . . .	169
168.	Mesonotum with dorsal midline marked by a pale fascia bordered either side by black; last male sternite (sternite VIII) long, longer than the combined lengths of the two previous sternites . . . . .	<b>Yoyetta gen. n.</b>
–	Thoracic dorsal midline unmarked; last male sternite (sternite VIII) short, clearly less than the combined lengths of the two previous sternites . . . . .	<b>Taurella gen. n.</b>
169.	Rostrum reaching no further than bases of hind coxae . . . . .	<b>Limnopsalta gen. n. (L. stradbokensis)</b>
–	Rostrum clearly passing bases of hind coxae, almost reaching apices . . . . .	<b>Telmapsalta gen. n. (T. hackeri)</b>
170.	Thorax above green, greenish or orange; a broad dark red fascia on midline of mesonotum and sometimes also on pronotum . . . . .	<b>Ewartia gen. n. (E. oldfieldi)</b>
–	Not coloured as above . . . . .	171
171.	Male . . . . .	172
–	Female . . . . .	202
172.	Abdomen below swollen, with the bases of <u>all</u> sternites clearly visible in lateral profile (Fig. 102) . . . . .	173
–	Abdomen below not unusually swollen, with <u>some</u> distal sternites not visible in lateral profile . . . . .	182
173.	Abdominal tergite 1 large and as long as any one of abdominal segments 3–6 when measured along dorsal midline . . . . .	174
–	Abdominal tergite 1 small, and much shorter than any other abdominal segment (Fig. 105) . . . . .	175
174.	Base of operculum swollen and bubble-like . . . . .	<b>Physeema gen. n.</b>
–	Base of operculum flat . . . . .	<b>Chelapsalta gen. n. (C. puer, Pl. 2)</b>
175.	Abdomen in dorsal view entirely reddish, orange, yellowish or green except for a black (or nearly black) segment 8 . . . . .	<b>Palapsalta gen. n.</b>
–	Abdomen not as above . . . . .	176
176.	Width of head including eyes less than maximum width of abdomen . . . . .	177
–	Width of head including eyes equal to or greater than maximum width of abdomen . . . . .	179
177.	Abdomen exceptionally broad and stout, the length along dorsal midline of segments 1 and 2 combined about equal to the length of segments 3 and 4 combined (abnormal specimens; rarely encountered) . . . . .	<b>Mugadina gen. n.</b>
–	Abdomen broad but not exceptionally so, the length along dorsal midline of segments 1 and 2 combined about equal to the length of segments 3, 4 and 5 combined . . . . .	178
178.	Male sternites 3–6 pale, without black markings; abdomen above never entirely black . . . . .	<b>Telmapsalta gen. n. (T. hackeri)</b>
–	Male sternites 3–6 with a broad black fascia along midline OR if lacking such a fascia then abdomen above entirely black . . . . .	<b>Myopsalta gen. n.</b>
179.	Opercula small, covering only about half of tympanal cavity . . . . .	<b>Crotopsalta</b>
–	Opercula of usual size, almost covering tympanal cavity . . . . .	180
180.	Fore wing basal membrane orange . . . . .	181
–	Fore wing basal membrane grey or blackish . . . . .	<b>Limnopsalta gen. n. (L. stradbokensis)</b>
181.	Abdomen above mostly orange or orange brown (rarely yellowish) with a broad black midline . . . . .	<b>Yoyetta gen. n.</b>
–	Abdomen above mostly black, only the distal margins of segments orange or orange brown (Pl. 2, fig. 5) . . . . .	<b>Gagatopsalta</b>
182(172).	Last abdominal sternite VIII very long, its exposed length about equal to combined lengths of previous three sternites . . . . .	183
–	Last abdominal sternite VIII short (Fig. 108), its exposed length no longer than combined lengths of previous two sternites, often much less . . . . .	184
183.	<u>Base</u> of abdomen below with a large dish-shaped round depression (a species confined to Norfolk I.) . . . . .	<b>Kikihia (K. convicta)</b>
–	<u>Base</u> of abdomen with or without a depression, if present never round and dish-like . . . . .	<b>Yoyetta gen. n.</b>
184.	Opercula saucer-shaped, extending distally to sternite III (Fig. 106) . . . . .	<b>Birrima</b>
–	Opercula more or less flat, curved towards abdominal midline, not extending to sternite III (Figs 107, 108) . . . . .	185

185.	Opercula small, sickle-shaped, clearly not developed around base of meracanthus (Fig. 107) . . . . .	186
–	Opercula tending not sickle-shaped, developed around base of meracanthus (Fig. 108) . . . . .	187
186.	Pronotum in dorsal view gradually narrowing throughout much of its length towards posterior (Fig. 54. Pl 2, fig. 17) . . . . .	<i>Plerapsalta</i> gen. n.
–	Pronotum in dorsal view more or less parallel-sided or widening towards posterior . . . . .	<i>Taurella</i> gen. n.
187.	Abdominal tergite 1 glossy, domed and large, length when measured along dorsal midline similar to or slightly smaller than the largest of other abdominal segments . . . . .	188
–	Abdominal tergite 1 not glossy, flat and small, length when measured along dorsal midline similar to the smallest of other abdominal segments . . . . .	189
188.	Rostrum reaching almost to apices of hind coxae . . . . .	<i>Pyropsalta</i> gen. n. ( <i>P. melete</i> )
–	Rostrum reaching to near bases of hind coxae . . . . .	<i>Myopsalta</i> gen. n.
189.	Meracanthus rudimentary, very short, often obtuse (Fig. 108) . . . . .	<i>Sylphoides</i> gen. n. ( <i>S. arenaria</i> )
–	Meracanthus normal, developed into a flat, pointed spine (Figs 106, 107) . . . . .	190
190.	Upper pygofer lobes very long, the most distal part of pygofer, often (but not always) distally expanded (Fig. 88) (always exposed on dried specimens) . . . . .	191
–	Upper pygofer lobes small to moderately developed, not the most distal part of pygofer, distally rounded (Figs 109, 110) (often not exposed on dried specimens) . . . . .	192
191.	Head including eyes broad, clearly wider than mesonotum between wings . . . . .	<i>Palapsalta</i> gen. n.
–	Head including eyes about as wide as mesonotum between wings . . . . .	<i>Pauropsalta</i>
192.	Abdomen much abbreviated, the ratio of length/width 1.3x or less . . . . .	<i>Ewartia</i> gen. n. ( <i>E. brevis</i> )
–	Abdomen not abnormally abbreviated . . . . .	193
193.	<i>From here on it may be necessary to dissect the male genitalia<sup>1</sup> (alternatively try keying a female)</i>	
	Aedeagus with its distal end turned through 180° (Figs 110, 114); four long timbal ribs spanning the full height of the timbal . . . . .	<i>Yoyetta</i> gen. n.
–	Aedeagus not turned through 180° (Fig. 84); three long timbal ribs spanning the full height of the timbal . . . . .	194
194.	Claspers diverging towards their distal ends (Figs 111, 112) . . . . .	195
–	Claspers distally parallel (or almost so) to each other (Fig. 113) . . . . .	199
195.	Claspers with their <u>apices</u> very widely separated, forming the widest dimension of the claspers (Fig. 111) . . . . .	<i>Gagatopsalta</i>
–	Claspers with their <u>apices</u> not widely separated, nowhere near the widest dimensions of the claspers (Fig. 112) . . . . .	196
196.	Pygofer basal lobe in lateral view abutted against or tucked behind pygofer margin . . . . .	197
–	Pygofer basal lobe in lateral view standing clear of pygofer margin . . . . .	<i>Heliopsalta</i> gen. n. ( <i>H. polita</i> , Pl 1)
197.	Rostrum long, reaching or almost reaching apices of hind coxae; fore wing basal membrane grey or blackish, never orange . . . . .	<i>Telmapsalta</i> gen. n. ( <i>T. hackeri</i> )
–	Rostrum reaching to about apices of mid coxae; fore wing basal membrane usually orange . . . . .	198
198.	Abdominal segment 2, where it forms posterior side of timbal cavity, sharply angular . . . . .	<i>Simona</i> gen. n. ( <i>S. sancta</i> )
–	Abdominal segment 2, where it forms posterior side of timbal cavity, very rounded . . . . .	<i>Chelapsalta</i> gen. n. ( <i>C. puer</i> , Pl 2)
199(194).	Pygofer lacking a dorsal beak . . . . .	201
–	Pygofer with a spine-like dorsal beak . . . . .	200
200.	Fore wing basal membrane orange; opercula curved towards abdominal midline . . . . .	<i>Plerapsalta</i> gen. n.
–	Fore wing basal membrane grey or blackish; opercula directed distally, not curved towards abdominal midline . . . . .	<i>Drymopsalta</i>
201.	Fore wing unusually broad; abdomen substantially black with tergite 8 entirely black . . . . .	<i>Platypsalta</i> gen. n.
–	Fore wing not unusually broad; abdomen often substantially brown including tergite 8 which always has at least its distal third yellowish, brown or reddish . . . . .	<i>Crotopsalta</i>

1. Usually a relaxed specimen will suffice. If dissection is deemed necessary proceed as follows: (1) from a relaxed specimen gently ease pygofer from abdomen by cutting outer segmental membrane with a sharp pin; (2) place dissected pygofer in 10%- potassium hydroxide overnight at room temperature; (3) transfer to water to rinse, changing water 2-3 times; (4) in a Petri dish of water or 75% ethanol, clean any debris from specimen and examine; (5) after examination store in 75% ethanol.

202(171).	Abdominal segment 9 lacking a dorsal beak . . . . .	203
–	Abdominal segment 9 with a dorsal beak . . . . .	205
203.	Ovipositor sheath terminating about level with end of abdomen . . . . .	204
–	Ovipositor sheath very long, terminating far beyond end of abdomen . . . . .	<i>Myopsalta</i> gen. n.
204.	Abdominal segment 9 never black across dorsal surface . . . . .	<i>Crotopsalta</i>
–	Abdominal segment 9 always black across dorsal surface . . . . .	<i>Platypsalta</i> gen. n.
205.	Ovipositor sheath extending beyond end of abdomen (Fig. 104) . . . . .	206
–	Ovipositor sheath terminating about level with end of abdomen (Fig. 103) . . . . .	220
206.	Meracanthus degenerate, almost domed with hardly any distal development . . . . .	207
–	Meracanthus well developed and distally produced . . . . .	208
207.	Abdomen about as wide as thorax and head . . . . .	<i>Sylphoides</i> gen. n. ( <i>S. arenaria</i> )
–	Abdomen clearly wider than thorax and head . . . . .	<i>Mugadina</i> gen. n.
208.	Head clearly wider than mesonotum between wings . . . . .	209
–	Head of similar width or narrower than mesonotum . . . . .	214
209.	Meracanthus narrow at base, finger-like . . . . .	<i>Taurella</i> gen. n.
–	Meracanthus broad at base, in shape either triangular or narrowed apically . . . . .	210
210.	Pronotum dominantly black with a broad brown, reddish or yellowish midline . . . . .	211
–	Pronotum dominantly tan or brown, usually with some black markings . . . . .	212
211.	Fore wing basal membrane grey . . . . .	<i>Pauropsalta</i>
–	Fore wing basal membrane orange . . . . .	<i>Palapsalta</i> gen. n.
212.	Rostrum reaching only to apices of <u>mid</u> coxae . . . . .	<i>Palapsalta</i> gen. n.
–	Rostrum reaching to at least bases of <u>hind</u> coxae . . . . .	213
213.	Dorsal region of postclypeus flat and horizontal; operculum <u>usually</u> not reaching to level of meracanthus apex . . . . .	<i>Yoyetta</i> gen. n.
–	Dorsal region of postclypeus rounded with virtually no horizontal area; operculum always reaching or surpassing level of meracanthus apex . . . . .	<i>Ewartia</i> gen. n. ( <i>E. brevis</i> )
214(208).	Rostrum clearly passing bases of hind coxae, almost reaching apices . . . . .	215
–	Rostrum reaching no further than about bases of hind coxae . . . . .	216
215.	Ovipositor sheath very long, extending some 2 mm or more; brown cicadas . . . . .	<i>Telmapsalta</i> gen. n. ( <i>T. hackeri</i> )
–	Ovipositor sheath extending about 1 mm; dominantly black cicadas . . . . .	<i>Pyropsalta</i> gen. n. ( <i>P. melete</i> )
216.	Width of head clearly narrower than maximum width of abdomen . . . . .	219
–	Width of head as wide as or wider than maximum width of abdomen . . . . .	217
217.	Fore wing basal membrane orange or orange brown . . . . .	<i>Yoyetta</i> gen. n.
–	Fore wing basal membrane black or grey . . . . .	218
218.	Ovipositor sheath very long, extending far beyond dorsal beak, many times the length of dorsal beak . . . . .	<i>Yoyetta</i> gen. n.
–	Ovipositor sheath short, extending beyond dorsal beak but no more than twice the length of dorsal beak . . . . .	<i>Limnopsalta</i> gen. n.
219.	Postclypeus clearly grooved along a substantial length of ventral midline . . . . .	<i>Chelapsalta</i> gen. n. ( <i>C. puer</i> , Pl. 2, fig. 5)
–	Postclypeus smooth or with just a hairline groove on part of ventral midline (a species confined to Norfolk I.) . . . . .	<i>Kikihia</i> ( <i>K. convicta</i> )
220(205).	Width of head including eyes clearly wider than paranota (lateral margins of pronotum) (Fig. 93) . . . . .	221
–	Width of head including eyes about as wide or narrower than paranota (Fig. 92) . . . . .	226
221.	Rostrum reaching to apices of mid coxae . . . . .	<i>Gagatopsalta</i>
–	Rostrum clearly past apices of mid coxae . . . . .	222

222.	Ulnar cells 1–4 all similar in length and tending parallel-sided (similar to Fig. 73) . . . . .	<i>Chelapsalta</i> gen. n. ( <i>C. puer</i> )	
–	Ulnar cells 1–4 variable in length and shape (Fig. 70) . . . . .		223
223.	Fore wing length less than 19 mm . . . . .	<i>Plerapsalta</i> gen. n.	
–	Fore wing length greater than 19 mm . . . . .		224
224.	Fore wing with fused stem of veins M and CuA long, greater than length of long side of basal cell . . . . .	<i>Yoyetta</i> gen. n.	
–	Fore wing with fused stem of veins M and CuA short, less than length of long side of basal cell . . . . .		225
225.	Fore wing basal membrane grey or whitish . . . . .	<i>Physeema</i> gen. n.	
–	Fore wing basal membrane red or orange . . . . .	<i>Yoyetta</i> gen. n.	
226(220).	Rostrum reaching to about <u>apices</u> of hind coxae . . . . .	<i>Birrima</i>	
–	Rostrum reaching no further than about <u>bases</u> of hind coxae . . . . .		227
227.	Fore wing radial cell about as long as ulnar cell 1 (Fig. 97) . . . . .		228
–	Fore wing radial cell long, clearly longer than ulnar cell 1 . . . . .		229
228.	Fore wing basal membrane grey . . . . .	<i>Heliopsalta</i> gen. n. ( <i>H. polita</i> )	
–	Fore wing basal membrane orange . . . . .	<i>Simona</i> gen. n. ( <i>S. sancta</i> )	
229.	Very small cicadas with a fore wing length less than 11 mm . . . . .	<i>Drymopsalta</i>	
–	Larger cicadas with a fore wing length 14 mm or longer . . . . .		230
230.	Postclypeus clearly grooved along a substantial length of midline . . . . .	<i>Yoyetta</i> gen. n.	
–	Postclypeus smooth with just a hairline groove on part of midline . . . . .	<i>Kikihia</i>	

## GENERIC REVIEWS AND DIAGNOSES

### Genus *ABRICTA* Stål

Moulds (2003) revised this genus, transferring *A. curvicosta* to *Aleeta* Moulds and the majority of the remaining Australian species to *Tryella* Moulds. The four Australian species remaining in *Abricta* are here transferred to other genera as listed below because they lack characteristic features of that genus such as large eyes and male genitalia with secondary basal pygofer lobes and conjunctival claws. Thus, no Australian species now remains in *Abricta*.

**Excluded species:** The following are transferred to other genera as listed.

*borealis* (Goding and Froggatt), to *Adelia* gen. n., *q.v.*

*burgessi* Distant, to *Tamasa*, *q.v.*

*cincta* (Fabricius), to *Diemeniana*, *q.v.*

*occidentalis* Goding and Froggatt, to *Pictila* gen. n., *q.v.*

### Genus *ADELIA* gen. n.

**Type species:** *Abricta borealis* Goding and Froggatt, 1904 (Pl. 1, figs 9a, 9b).

**Included species:** AUSTRALIA: *borealis* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *adelos* meaning unknown or obscure, and referring to the obscure and seemingly elusive nature of this species.

**Distribution** (Fig. 116h): South-western Western Australia. The only confirmed locality is Yarloop.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax:* pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at

dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth (absent on some individuals); cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 116f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; costa of male strongly bowed on distal half; pterostigma present; vein CuA strongly bowed so that cubital cell much larger than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation overlaying veins at bases of apical cells 2, 3 and part of 4, infuscations elsewhere lacking; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 116g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 116e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, meeting or almost so, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 116e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites normal (not unusually swollen), sternites III–VI in cross-section convex. *Timbals* with four long ribs spanning the full height of the timbal and one not so long, spaced with intermediate short ribs; basal dome large; anterior part of timbals mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

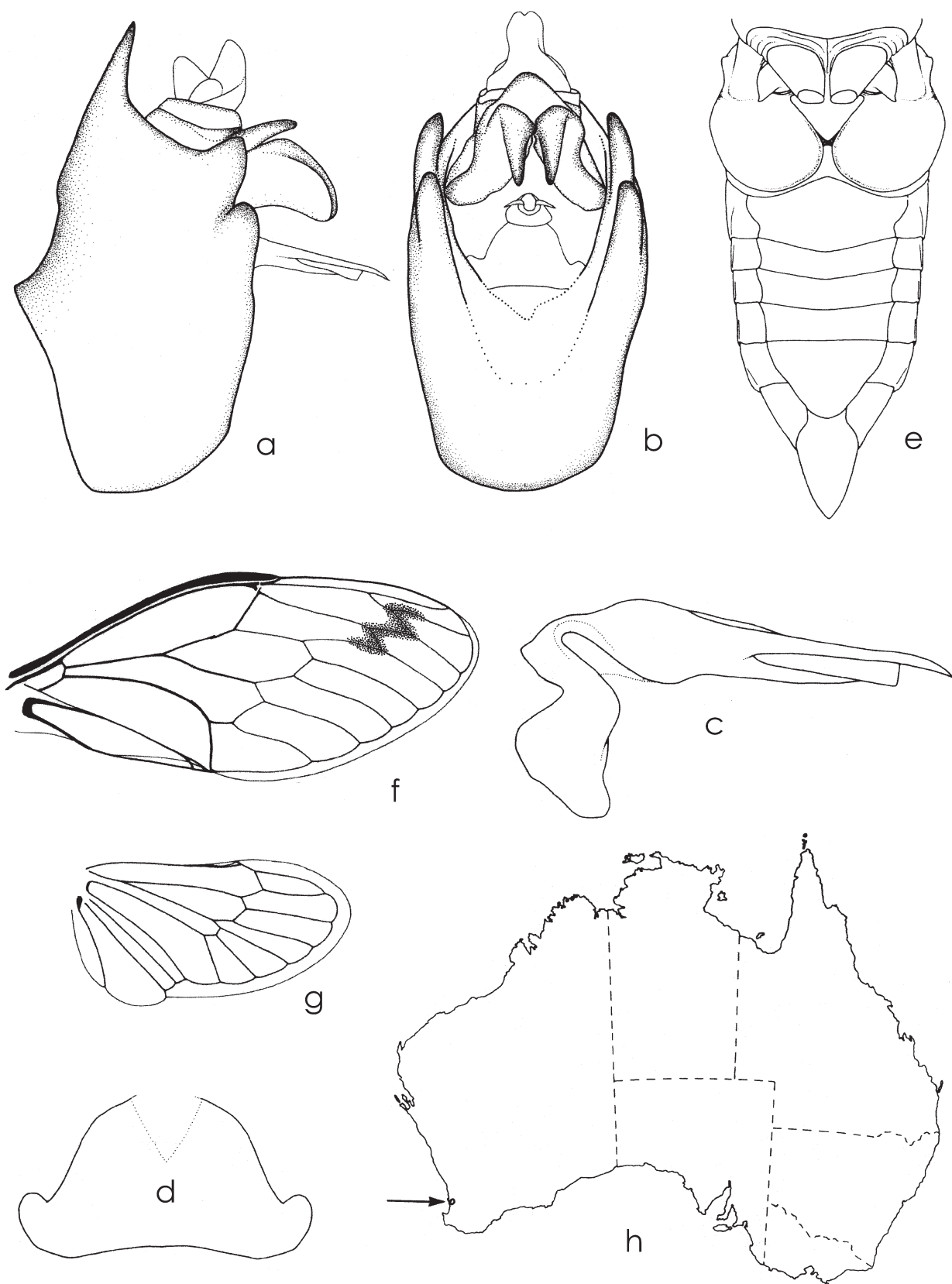
*Male genitalia* (Figs 116a-d). Pygofer in ventral view ovoid to subovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat; wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back, thecal shaft nearly straight; pseudoparameres present, dorsal to theca and originating distal to thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of their length with proximal half or so diverging from ventral support; endotheca exposed, chitinous; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to medium-sized cicadas. Distinguished from other genera by having the combination of fore wing veins M and CuA close together at the basal cell but not meeting, vein CuA strongly bowed compressing the medial cell, infuscations present at bases of apical cells 2 and 3 and partly on 4, and the male opercula meeting or almost so. The male aedeagus has a typically 'trifid' theca with an exposed but chitinous endotheca. The modified fore wings give the single known species a distinctive appearance (Fig. 116f and Pl. 1).

**Discussion.** The phylogenetic relationships of this genus have been discussed by Moulds (2005a) represented in the analyses by the species name *Abricta borealis*.





**FIGURE 116.** Genus *Adelia* **gen. n.:** (a) *A. borealis* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) underside of male body showing opercula; (f) the same, right fore wing; (g) the same, right hind wing; (h) generic distribution.



## Genus *ALEETA* Moulds

*Aleeta* Moulds, 2003: 263; Moulds, 2005a: 393, 402, 413, 425, 430, 437; Moulds, 2005b: 133–138, 140; Duffels, 2011: 81.

**Type species:** *Cicada curvicosta* Germar, 1834, by original designation.

**Included species:** AUSTRALIAN: *curvicosta* (Germar 1834). OTHERS: none.

**Distribution** (Fig. 117j): Eastern Australia from the Daintree River, northern Queensland, to Bendalong on the NSW mid South Coast, mainly coastal but also inland (Moulds 2003).

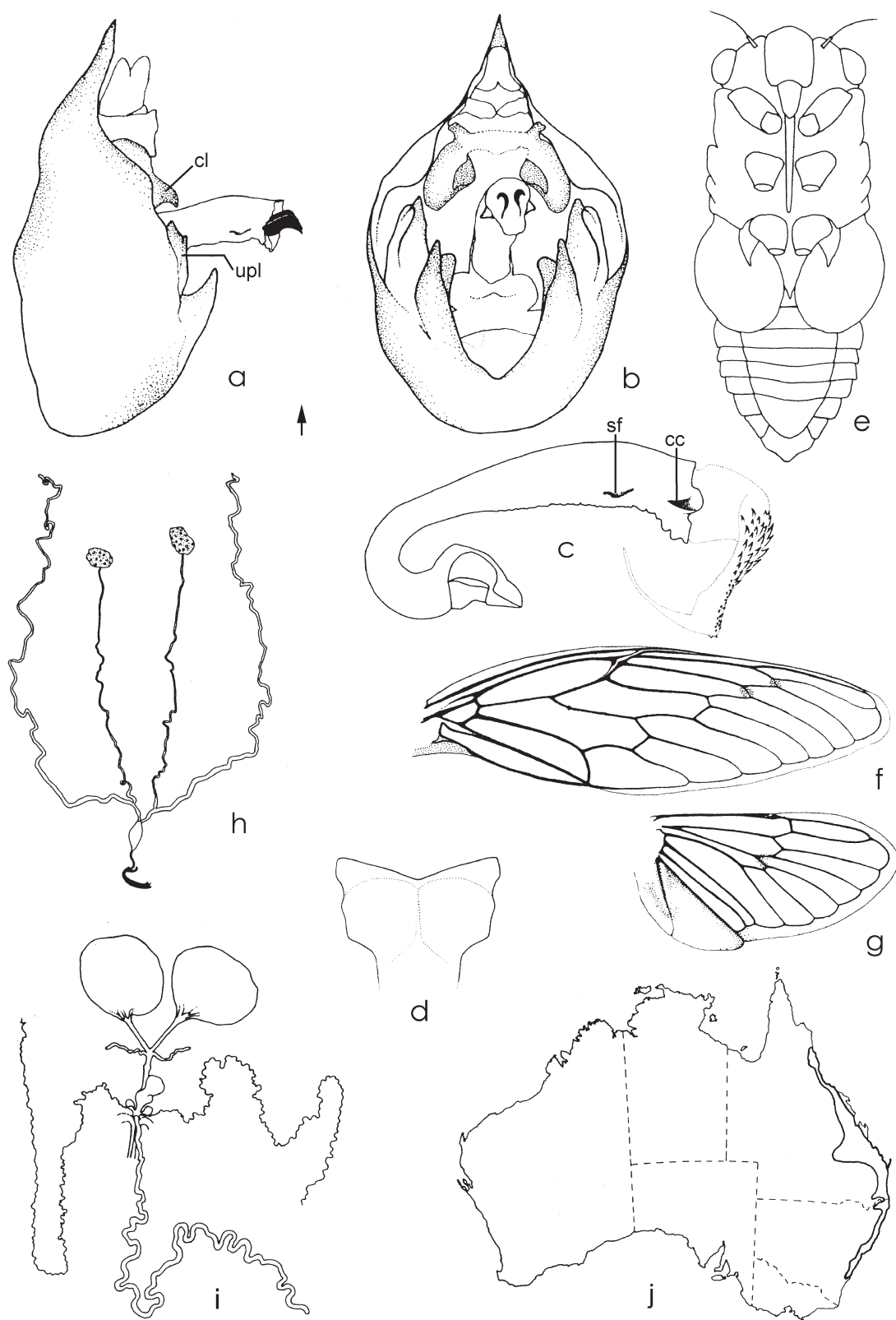
**Diagnosis.** *Head* including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, mid lateral tooth absent; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 117f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) clearly higher than R+Sc; costal margin anterior of costa strongly ampliate, reducing to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but not touching; vein CuA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3 in some species, also at distal end of vein RA<sub>2</sub>; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 117g) with 6 apical cells; infuscation at distal end of vein 2A spread on wing margin; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 117e) broad, almost meeting, extending laterally beyond lateral margin of abdomen and distally clearly beyond tympanal cavities. *Male abdomen* (Fig. 117e). in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites 4–6 in cross-section flat except for upward tilted margin. *Timbal* covers absent, timbal ribs many, and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases. *Male genitalia* (Figs 117a–d). Pygofer with distal shoulders not developed; upper lobes small to moderately developed, set well away from dorsal beak, tending to be bilobed; basal lobe divided creating secondary basal lobe, large, in lateral view projecting outwards, approximately triangular; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, widely separated, restraining aedeagus, beak-like, down-turned. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view basally divided into two discs with apical arms lobe-like; basal portion of basal plate directed forwards away from thecal shaft; ventral rib rod-like with attachment only at ends; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through some 140°; pseudoparameres absent; thecal apex entirely chitinized; thecal subapical cerci absent; flabellum present; conjunctival claws present, flattened, broad in lateral view, narrow in ventral view; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 117h) with accessory glands long.

*Female reproductive system* (Fig. 117i) ditrysian; accessory glands of common oviduct short, no longer than common oviduct.

**Distinguishing characters.** Medium-sized cicadas. Distinguished from other Australian genera except *Tryella* by lacking timbal covers and having the fore wing costal margin anterior of costa ampliate to the node, the maximum dilation clearly wider than the costal vein. Differs from *Tryella* in size, the fore wing rarely less than 32 mm in length, usually over 40 mm; that of *Tryella* never reaching 32 mm, usually less than 26 mm.

The male genitalia are very distinctive; the sublateral flanges on the aedeagus are unique to *Aleeta* and the laterally flattened conjunctival claws of *Aleeta* are unlike those of any other cicada genus. The beak-like claspers and the partially bifurcate upper pygofer lobes do not occur in allied genera.

**Discussion.** The single species in this genus and its associated literature has been reviewed by Moulds (1990, 2003) including a detailed analysis of its song. Its phylogenetic relationships have been discussed by Moulds (2003, 2005a). Notes on emergence patterns and densities and other aspects of biology can be found in Ewart (2001a) and Emery *et al.* (2005). Further notes on the single species included in this genus, including its song, are provided by Ewart (1995) and Young & Josephson (1983). Note that the structures referred to as uncal lobes in Moulds (2003) are in fact claspers (see Moulds 2005a for discussion of homologies).



**FIGURE 117.** Genus *Aleeta* Moulds: (a) *A. curvicosta* (Stål), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view with vesica extended; (d) the same, basal plate, dorsal view, apex at top; (e) the same, male head and body, ventral view showing opercula; (f) the same, right fore wing; (g) the same, right hind wing; (h) the same, male reproductive system, dissection with aedeagus removed from pygofer; (i) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (j) generic distribution. *cc* conjunctival claw, *cl* clasper, *sf* sublateral flange, *upl* upper pygofer lobe.

## Genus *ANAPSALTODA* Ashton

*Anapsaltoda* Ashton, 1921: 96; Neave, 1939a: 177; Burns, 1957: 615; Metcalf, 1963: 155; Duffels and van der Laan, 1985: 53; Moulds, 1990: 71; Moulds, 2005a: 377, 387–391, 412, 413.

**Type species:** *Psaltoda pulchra* Ashton, 1921, by original designation.

**Included species:** AUSTRALIAN: *pulchra* (Ashton, 1921). OTHERS: none.

**Distribution** (Fig. 118e): North-eastern Queensland, where it is restricted to the Atherton Tableland and adjoining ranges and the Kirrama Range (Moulds 1990).

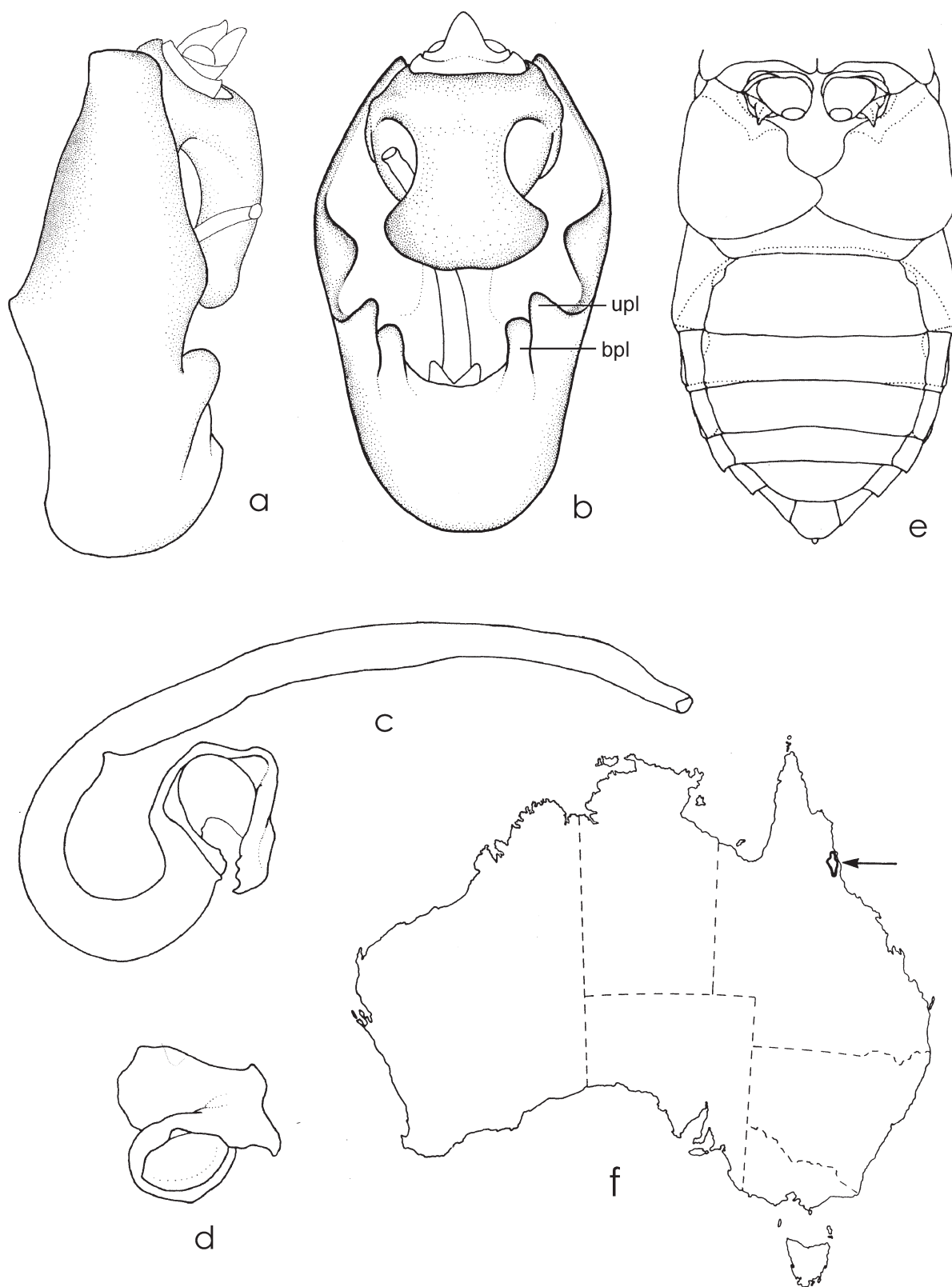
**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline broad, equal to about diameter of eyes or a little greater; paranota ampliate, evenly rounded, sloping forwards, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) no higher than R+Sc; costa reducing to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3, also at extremities of longitudinal veins adjacent to ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; infuscation along much of ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe pigmented orange, broad with vein 3A curved, long and separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 118e) completely covering rim of distal margin of tympanal cavity, opercula overlapping, reaching level with distal margin of tergite 2; lateral margin very long and straight. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 enlarged, accounting for approximately half abdominal length; sternites IV–VII in cross-section entirely flat. *Timbal* covers present, flat, fully rounded dorsally and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule. Timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 118a–d). Pygofer with distal shoulders broad, rounded, the most distal part of pygofer; upper lobes thickened, well developed; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe finger-like and with very broad apex, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Large, robust cicadas, essentially green and gold in colour. The hind wing anal lobe, which is entirely and boldly pigmented orange, clearly distinguishes this genus from any other Australian genus. Also differs from the closely allied genera *Psaltoda* and *Neopsaltoda* in having the supra-antennal plate curved under the head so that when viewed ventrally the rim is clearly positioned on the ventral side of the head. The male genitalia have a distinctive uncal lobe which in dorsal view is broad with an expanded, broad apex (Fig. 118b), plus restraint of the aedeagus by fleshy sinuation prior to the aedeagus reaching the ventral surface of the uncus; characters shared only with *Psaltoda* and *Neopsaltoda*.

**Discussion.** The single species in this genus has been reviewed by Moulds (1990). Its phylogenetic relationships have been discussed by Moulds (2002, 2005a).



**FIGURES 118.** Genus *Anapsaltoda* Ashton: (a) *A. pulchra* Ashton, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsolateral view, apex at right; (e) the same, male body, ventral view showing opercula; (f) generic distribution. *bpl* basal pygofer lobe, *upl* upper pygofer lobe.

## Genus *ARENOPSALTRIA* Ashton

*Arenopsaltria* Ashton, 1921: 97; Neave, 1939a: 288; Burns, 1957: 620, 621; Metcalf, 1963: 144; Duffels and van der Laan, 1985: 50; Moulds, 1990: 66; Moulds, 2005a: 377, 387, 391, 393, 423, 430, 431.

**Type species:** *Fidicina fullo* Walker, 1850, by original designation.

**Included species:** AUSTRALIAN: *fullo* (Walker, 1850), *nubivena* (Walker, 1858), *pygmaea* (Distant, 1904), OTHERS: none.

**Excluded species:** *unicolor* Ashton, to *Parnquila* gen. n., q.v.

**Distribution** (Fig. 119h): Coastal and subcoastal regions of Western Australia between the Murchison and Margaret Rivers and in South Australia from the Eyre Peninsula to the far north-west of Victoria (Moulds 1990).

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota marginally ampliate, no mid lateral tooth but margin serrate; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* (Fig. 119e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2–5 and 7, also at extremities of longitudinal veins near ambient vein, some species with additional vein infuscations; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 119f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine lying flat. *Male opercula* (Fig. 119g) covering rim of distal margin of tympanal cavity, reaching a little beyond level of distal margin of tergite 2, overlapping. *Male abdomen* (Fig. 119g): in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 enlarged, accounting for approximately half abdominal length; sternites IV–VII in cross-section convex. Timbal covers present, flat, fully rounded dorsally and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule, overlapping operculum. Timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

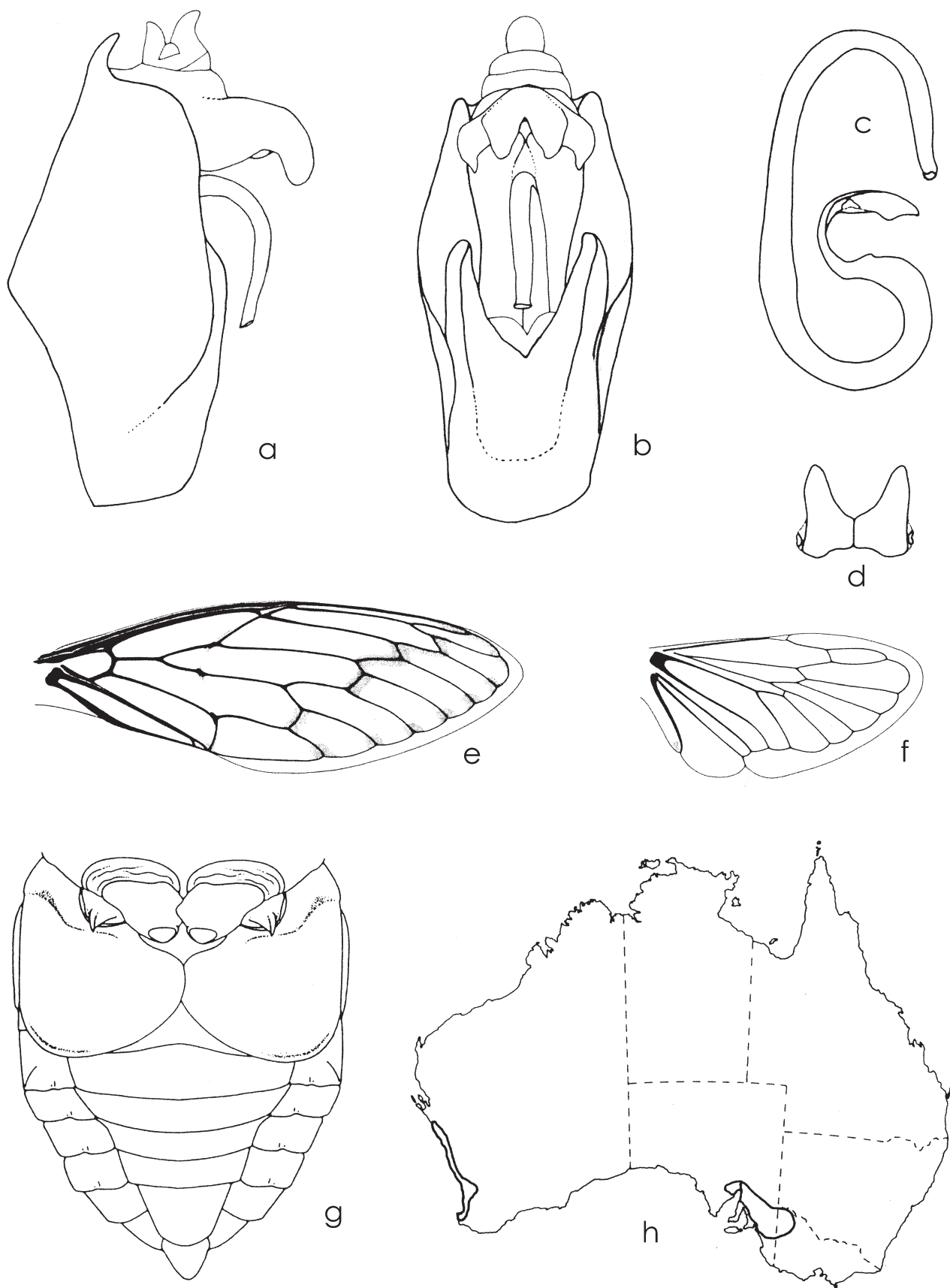
*Male genitalia* (Figs 119a–d). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe finger-like but broad with the widest point between rounded subapical lobes, apically bilobed, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped or spiral; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to medium-sized cicadas with robust bodies, deep brown to nearly black in colour, and broad wings strongly infuscated. Distinguished from other genera by having the combination of a pronotal collar with a serrate lateral margin (otherwise found only in *Henicopsaltria eydouxii*), and male timbal covers that substantially overlap the opercula. The extensive fore wing infuscations, although not unique in their arrangement to this genus, do tend to distinguish it from most genera; they are very bold and always present at the base of apical cell 7 and at the distal ends of the longitudinal veins. In addition, the fore wings are broad, their width about one third their length.

The male genitalia lack pygofer upper lobes, the theca is strongly recurved on its distal half, and the basal plate in lateral view is sharply turned through more than 90°.





**FIGURE 119.** Genus *Arenopsaltria* Ashton: (a) *A. fullo* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) the same, underside of body showing opercula; (h) generic distribution.



**Discussion.** The phylogenetic relationships of this genus have been discussed by Moulds (2005a). The species of this genus have been reviewed by Moulds (1990). Gwynne *et al.* (1988) provides notes on the biology, behaviour and song of *A. fullo*.

### Genus *ARUNTA* Distant

*Arunta* Distant, 1904a: 302; Distant, 1906d: 26; Froggatt, 1907: 349; Ashton, 1912d: 76; Distant, 1912a: 20; Ashton, 1914a: 346; Ashton, 1921: 90; Schulze, Kükenthal and Heider, 1926–40: 288; Kato, 1932: 152; Kato, 1933: 351; Neave, 1939a: 310; Kato, 1956: 67; Burns, 1957: 612; Burns, 1962a: 259; Burns, 1962b: 270; Popov, 1975a: 34; Popov, 1975b: 288; Metcalf, 1963: 141–2; Young, 1973: 378; Duffels and van der Laan, 1985: 49; Moulds, 1990: 58; Moulds 2005a: 387–389, 393, 413, 430, 434.

**Type species:** *Cicada perulata* Guérin-Méneville, 1831, by original designation.

**Included species:** AUSTRALIAN: *perulata* (Guérin-Méneville, 1831), *interclusa* (Walker, 1858). OTHERS: none.

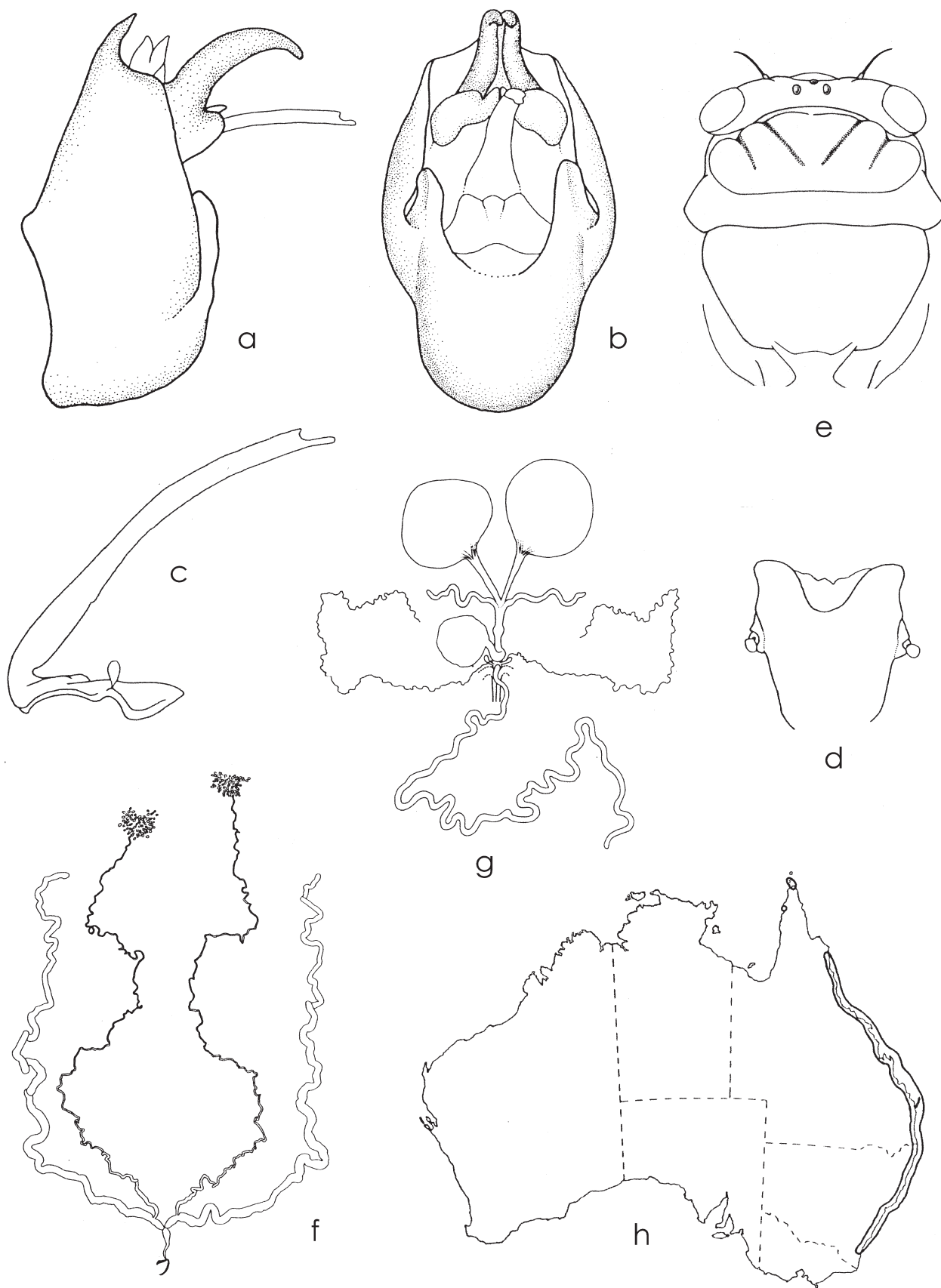
**Distribution** (Fig. 120h): Weipa district on the west coast of Cape York Peninsula and the eastern seaboard of Queensland and NSW from Hammond Island, Torres Strait, to Narooma (Ewart 2005b, Moulds 1990).

**Diagnosis.** *Head* (Fig. 120e) including eyes about as wide as mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 120e): pronotal collar width at dorsal midline broad, equal to about diameter of eyes or a little greater; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth but some individuals of *A. perulata* with margin finely serrate; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3 in some species, infuscations elsewhere lacking; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* completely covering tympanal cavity, completely encircling meracanthus, not overlapping. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; male tergites 2 and 3 enlarged, accounting for approximately half abdominal length; male sternites IV–VII in cross-section flat except for upward tilted margin. *Timbal* covers present, grossly swollen, sac-like and projecting distally, anterior dorsal margin fully rounded and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule. Timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 120a–d). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe finger-like, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view broad, apically broadly bilobed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 120f) with accessory glands long.

*Female reproductive system* (Fig. 120g) ditrysian; accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Medium-sized to large cicadas. Distinguished from all other Australian genera by having the combination of the distance between the supra-antennal plate and eye about equal to the length of the



**FIGURE 120.** Genus *Arunta* Distant: (a) *A. perulata* (Guérin-Méneville), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and pronotum; (f) the same, male reproductive system, dissection with aedeagus removed from pygofer; (g) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (h) generic distribution.

supra-antennal plate, a pronotal collar (Fig. 120e) that is broad across the dorsal surface (almost equal in width to the lesser diameter of the eyes) but with its lateral margins (paranota) largely confluent with the pronotum rather than strongly ampliate, and fore wing veins M and CuA widely separated at the basal cell. Further, the males of *Arunta* possess very large and very distinctive, bulbous, sac-like timbal covers, a feature shared within the Australian fauna only with *Thopha*; the colour of these timbal covers clearly differs between the two genera with those of *Arunta* being white while those of *Thopha* are dark brown or orange. Also, *Arunta* differs from *Thopha* in having the timbal covers extending backwards beyond the 2nd abdominal segment while those of *Thopha* reach only a little beyond the 1st abdominal segment, and the head of *Arunta* is narrow so that the eyes are closer together than the distance between the lateral fissures of the pronotum while the head of *Thopha* is very wide so that the distance between the eyes is greater than between the lateral fissures.

The male genitalia have a very characteristic uncus that is long and finger-like and almost paired except for a thin fusion along the length of its midline. The basal plate is rather flat, a condition very different from that of the allied genus *Thopha*.

**Discussion.** This is the only Australian genus that has adapted to salt water mangrove situations. Phylogenetic relationships can be found in Moulds (2005a). Burns (1962a) and Moulds (1990) have reviewed the genus. Notes on emergence patterns and densities for *A. perulata* are provided by Ewart (2001a). Further notes and song analyses can be found in Ewart (1995, 2001b, 2005b) and Young & Josephson (1983).

### Genus *AUSCALA* gen. n.

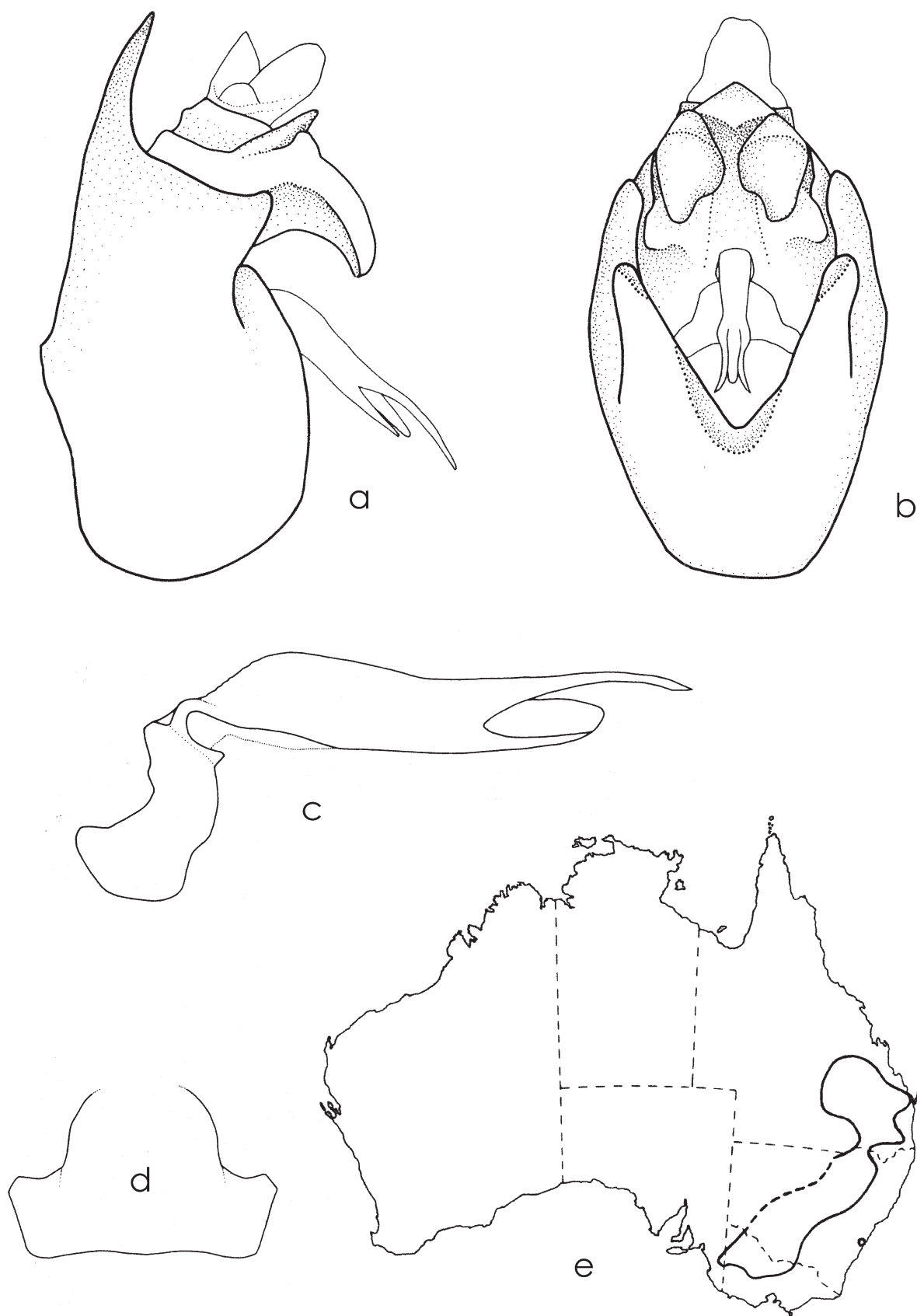
**Type species:** *Melampsalta spinosa* Goding and Froggatt, 1904.

**Included species:** AUSTRALIAN: *spinosa* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

**Etymology.** Derived from the word Australia and the Latin *cala*, a piece of wood, and indirectly referring to the male's song that resembles creaking tree branches. Feminine.

**Distribution** (Fig. 121e): South eastern Queensland south from near Edungalba (inland from Rockhampton), through central NSW and in western Sydney, and the drier north-west quarter of Victoria to Bordertown and Frances in the south-east of South Australia (Moulds 1990, Emery and Emery 2002, Smith 2010).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting; base (remnant of epimeron 3) much swollen and bubble-like. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); spaced with intermediate short ribs; basal dome large; not extended below wing bases; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbal covers absent.



**FIGURE 121.** Genus *Auscala* **gen. n.**: (a) *A. spinosa* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) generic distribution.

*Male genitalia* (Figs 121a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, apically rounded in lateral view; basal lobes undivided, moderately developed, rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, fang-like, excavated ventrally, restraining aedeagus; unfused; with a rounded, inward-facing swelling on inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view short and broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view directed upwards compared to thecal shaft with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small to medium-sized cicadas. Distinguished by having the combination of fore wing veins M and CuA with their stems fused as one on meeting the basal cell, the fore wings lacking infuscations, the paranota with a small mid lateral tooth, the base of the male opercula much swollen and bubble-like, and the anterior part of the timbals mostly occupied by ribs.

The male genitalia have a typically 'trifid' theca exposing a fleshy endotheca, and the claspers are inwardly swollen around mid length. The female has an exceedingly long abdominal segment 9 and a long projecting ovipositor sheath.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. The single described species in the genus is figured in Moulds (1990). Notes on the biology, distribution and synonymy of *A. spinosa* are provided by Moulds (1990). Haywood (2006a) provides notes on the distribution, habitat, song and conservation status of *A. spinosa* in South Australia. Popple & Strange (2002) provide notes on habitat in Queensland. Notes on emergence times and plant association are provided by Emery *et al.* (2005) and Ewart (1998a).

### Genus *BAETURIA* Stål

Since the publication of Moulds (1990), the three Australian species then placed in *Baeturia* have been transferred to other genera (de Boer, 1993a, 1995a) as listed below. Thus, *Baeturia* is no longer represented in the Australian fauna.

*flava* Goding and Froggatt, 1904, to *Guineapsaltria*, *q.v.*

*rufa* Ashton, 1914, to *Gymnotympana*, *q.v.*

*varicolor* Distant, 1907, to *Gymnotympana*, *q.v.*

### Genus *BIRRIMA* Distant

*Birrima* Distant, 1906a: 388; Distant, 1906d: 163, 178; Ashton, 1914a: 356; Schulze, Kükenthal and Heider 1926–40: 405; Kato, 1932: 186, 187; Neave, 1939a: 432; Kato, 1956: 70; Burns, 1957: 667; Metcalf, 1963: 274; Dugdale, 1972: 877; Duffels and van der Laan, 1985: 312; Moulds, 1990: 171; Moulds, 2005a: 390, 402, 413, 430, 436.

**Type species:** *Melampsalta castanea* Goding and Froggatt, 1904 [= *Birrima montrouzieri* Distant, 1906], by monotypy.



**Included species:** AUSTRALIAN: *castanea* (Goding and Froggatt, 1904), *varians* (Germar, 1834). OTHERS: none.

**Distribution** (Fig. 122j): Atherton district in northern Queensland, eastern Queensland south from Rockhampton and eastern NSW to near Sydney (Moulds 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 122f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell completely fused as one for part of their length; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 122g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 122e) broad but not meeting, reaching midlength of sternite III, strongly domed and somewhat saucer-shaped, clearly raised above level of tympanal cavity on its outer half. *Male abdomen* (Fig. 122e) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VI in cross-section flat except for upwardly tilted margin. *Timbal* covers absent; timbal ribs irregular in size, lacking prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.

*Male genitalia* (Figs 122a–d). Pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view downturned at distal end; in dorsal view T-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; pseudoparameres present, entirely lateral of theca, filiform or nearly so; thecal apex partly fleshy, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening dorsal on theca. *Male reproductive system* (Fig. 122h) with accessory glands short.

*Female reproductive system* (Fig. 122i) ditrysian; accessory glands of common oviduct short, no longer than common oviduct.

**Distinguishing characters.** Small cicadas. The domed, saucer-shaped male opercula (Fig. 122e), which are partly visible from above, are unique amongst Australian genera. Both sexes have sternite IV (and usually also other sternites) indented around the midline. Female abdominal segment 9 is slightly longer than an equilateral triangle in dorsal view, which, together with a rostrum that reaches almost to the apices of the hind coxae, also helps characterise females. The male aedeagus is clearly diagnostic for the genus, possessing a fleshy dorsal surface almost for its entire length and filiform pseudoparameres.

**Discussion.** The phylogenetic relationships of this genus have been discussed by Moulds (2005a). Moulds (1990) summarises the distribution and biology of the species. Coombs (1996) and Ewart (1995) provide further notes on *B. varians* and Ewart provides a song analysis.

## Review of selected species

### *Birrima castanea* (Goding and Froggatt)

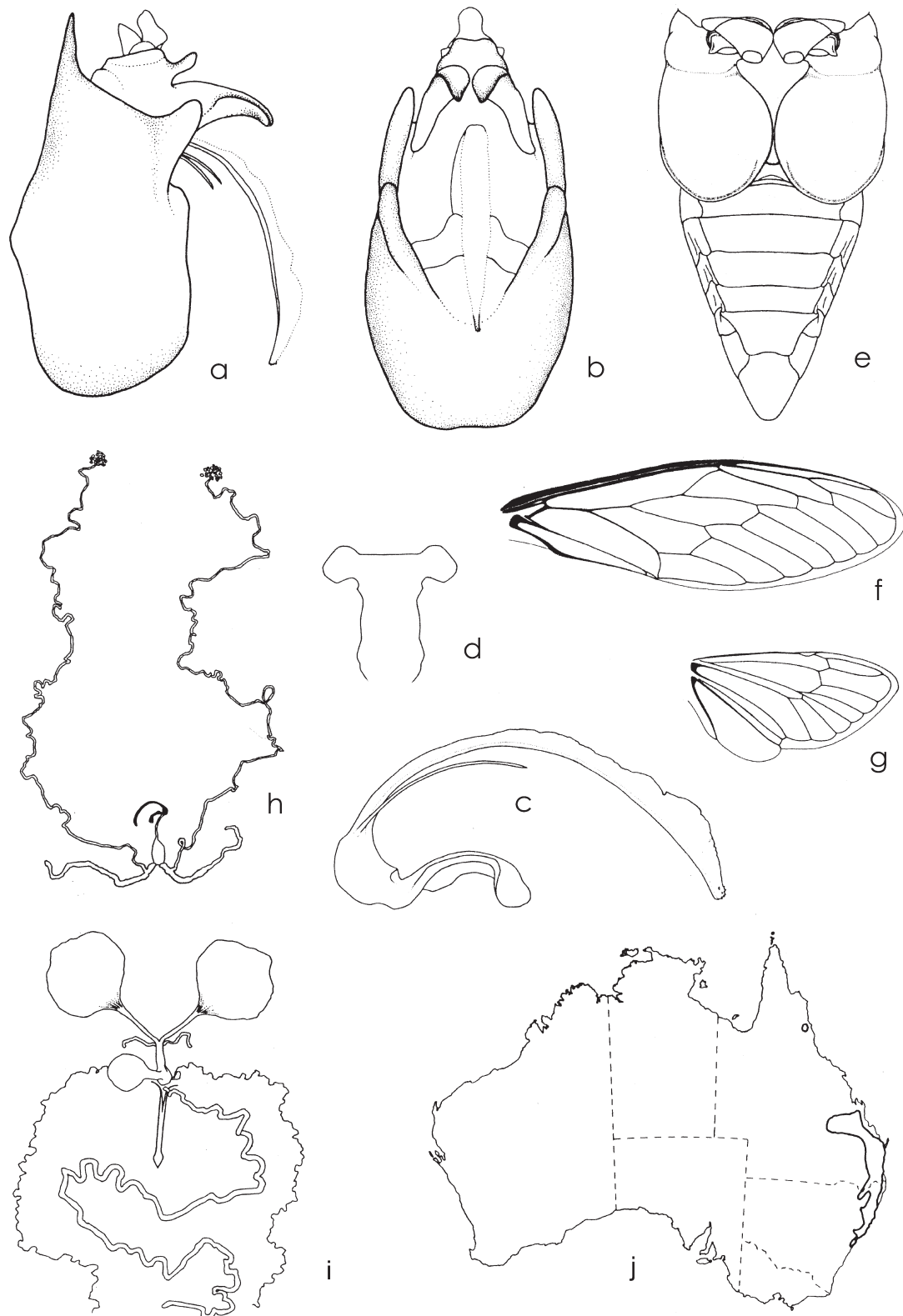
*Melampsalta castanea* Goding and Froggatt, 1904: 637–638

*Birrima montrouzieri* Distant, 1906a: 388–389

*Cicadetta montrouzieri* (Distant): Kirkaldy, 1907a: 16

*Birrima castanea* (Goding and Froggatt): Burns, 1957: 667





**FIGURE 122.** Genus *Birrima* Distant: (a) *B. castanea* Goding and Froggatt, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, underside of male body showing opercula; (f) the same, right fore wing; (g) the same, right hind wing; (h) male reproductive system, dissection with aedeagus removed from pygofer; (i) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (j) generic distribution.

*Cicadetta castanea* (Goding and Froggatt): Metcalf, 1963: 300  
*Melampsalta fulva* Goding and Froggatt, 1904: 648. **Syn. n.**  
*Cicadetta fulva* (Goding and Froggatt): Metcalf 1963: 314

A comparison of the type female of *M. fulva* from 'N.S.Wales' (in the BMNH) with females of *B. castanea* clearly showed that the two are conspecific. The holotype of *M. fulva* is a teneral specimen and not well coloured but it matches perfectly the colour of teneral females of *B. castanea*, as well as matching morphologically.

### Genus *BURBUNGA* Distant

*Burbunga* Distant, 1905e: 26, 29; Distant, 1906d: 128, 133; Ashton, 1914a: 350; Delétang, 1923: 629; Schulze, Kükenthal and Heider, 1926–40: 470; Kato, 1932: 180, 181; Neave, 1939a: 502; Metcalf, 1947: 163; Kato, 1956: 62, 69, 79, 84; Burns, 1957: 638; Metcalf, 1963: 215; Duffels and van der Laan, 1985: 237; Moulds, 1990: 127; Moulds 1994: 97; Moulds 2005a: 393, 416, 425, 429–431.

**Type species:** *Tibicen gilmorei* Distant, 1882, by original designation.

**Included species:** AUSTRALIAN: *albofasciata* Distant, 1907; *aterrima* (Distant, 1914); *gilmorei* (Distant, 1882); *hillieri* (Distant, 1907) (*nec. Burbunga hillieri* Distant, 1906), **comb. n.**; *inornata* Distant, 1905; *nanda* (Burns, 1964), **comb. n.**; *nigrosignata* (Distant, 1904), **comb. n.**; *occidentalis* (Distant, 1912), **comb. n.**; *parva* Moulds, 1994; *queenslandica* Moulds, 1994. OTHERS: none.

**Excluded species:** The following are transferred to other genera as listed.

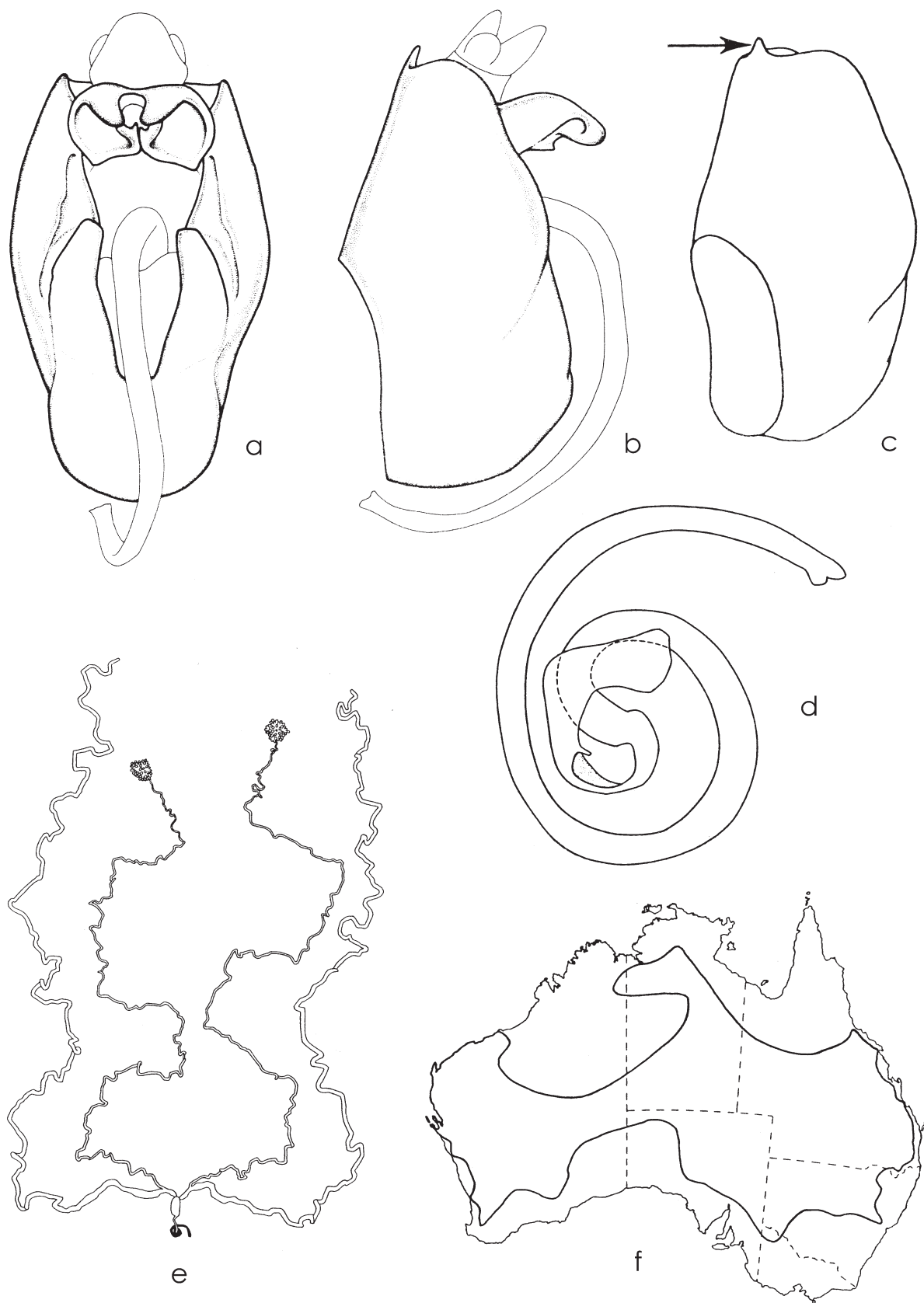
*hillieri* Distant, 1906, to *Parnquila* **gen. n.**, *q.v.*

*venosa* Distant, 1907, to *Parnquila* **gen. n.**, *q.v.*

**Distribution** (Fig. 123f): Throughout much of the southern half of Western Australia, through Northern Territory and the southern half of Queensland, much of western New South Wales and the northern half of South Australia (Moulds 1990, 1994a).

**Diagnosis.** *Head* including eyes wider than, about equal to, or narrower than mesonotum; distance between supra-antennal plate and eye about equal to or longer than length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; most species with infuscation overlaying veins at bases of apical cells 2–5 and 7, and at extremities of longitudinal veins; all species with infuscation or darkening of veins at bases of apical cells 2 and 3 but sometimes indistinct in *B. albofasciata*; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, and separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less confluent with distal margin of tympanal cavity, well developed towards abdominal midline with sharply rounded apex facing midline, clearly separated. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers present, rarely absent, if present then flat, reduced dorsally and not reaching metathorax, lower margin extending anteriorly from or very near auditory capsule, or sometimes effectively absent. Timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 123a–d). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately to weakly developed, tending to be almost straight and mostly hidden in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply



**FIGURE 123.** Genus *Burbunga* Distant: (a) *B. gilmorei* (Distant), male genitalia, ventral view; (b) the same, male genitalia, lateral view; (c) the same, pygofer showing dorsal beak; (d) aedeagus, lateral view; (e) *B. queenslandica*, male reproductive system, dissection with aedeagus removed from pygofer; (f) generic distribution.

angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped or spiraled; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 123e) with accessory glands long.

*Female* abdominal segment 9 short, dorsal midline about equal in length to abdominal tergites 2 and 3; ovipositor sheath marginally protruding. *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to very large cicadas. Distinguished from all other Australian genera except *Parnquila* by having the combination of a metanotum entirely concealed at dorsal midline, the basal cell of the fore wing long and slender, the epimeral lobe not reaching the operculum, and the apices of the supra-antennal plate rounded rather than pointed. In addition, the male timbal covers are reduced and do not close the timbal cavities and all but *B. albofasciata* have a very wide head with the distance between the eyes greater than the distance between the lateral fissures of the pronotum.

The male genitalia are definitive in characterising the genus, having a small development of the distal shoulders, no upper pygofer lobes, small basal lobes, fleshy tubular uncus encapsulation of the aedeagus, and a spiraled aedeagus with a basal plate that is turned back against the thecal shaft and is deeply divided so that part sits either side of the shaft (Fig. 123d).

*Burbunga* is readily distinguished from *Parnquila* by the male genitalia; notable differences being the spiraled theca, the vesical opening (gonopore) not ventrally positioned at the apex of the theca, and the basal plate that is turned back on the thecal shaft.

**Discussion.** The species listed as new combinations above all originate from *Macrotristria*. They possess the following characters typical of *Burbunga*: the male timbal covers are weakly developed, the male opercula cover the tympanal cavities but do not meet, and the male genitalia have a pygofer bearing a dorsal beak, an uncus that secures the aedeagus by tubular encapsulation and a spiraled aedeagus.

The phylogenetic relationships of this genus have been discussed by Moulds (2005a). Several species of this genus have been reviewed by Moulds (1990, 1994). Notes on species, including song analyses and/or habitat, can be found in Ewart (1988, 1998a), Ewart & Popple (2001) and Popple & Strange (2002).

## Review of selected species

### *Burbunga hillieri* (Distant, 1907), comb. n.

*Macrotristria hillieri* Distant, 1907: 413 (*nec Burbunga hillieri* Distant, 1906).

The transfer of *M. hillieri* to *Burbunga* places it as a junior homonym of *B. hillieri* Distant, 1906. However, *B. hillieri* is transferred from *Burbunga* to *Parnquila* **gen. n.** which eliminates the situation of having two species named *hillieri* in the genus simultaneously. Following Article 59.2 of the Code (fourth edition) concerning secondary homonyms *Burbunga hillieri* Distant, 1907, comb. n. retains its original name.

Fore wing infuscation of this species varies over its geographic range (Moulds 1990) with specimens from Queensland showing little to no infuscation while the most boldly marked individuals occur in coastal districts of Western Australia. These boldly marked specimens have infuscations nearly identical to *B. gilmorei* and its allies. *Burbunga hillieri* and *B. nanda* comb. n., are now by far the largest species of *Burbunga*.

## Genus *CALIGINOPSALTA* Ewart

*Caliginopsalta* Ewart 2005a: 470–471.

**Type species:** *Caliginopsalta percola* Ewart, 2005, by original designation (Pl. 2, fig. 3).

**Included species:** AUSTRALIAN: *percola* Ewart, 2005. OTHERS: none.

**Distribution** (Fig. 124g): Inland areas of south-eastern Queensland south from Theodore and west to Millmerran (Ewart 2005a).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view narrowing towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; no mid lateral tooth, rounded; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 124f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa of male gently and evenly curved; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest, sometimes nearly equal; veins CuP and 1A fused in part; distance between crossveins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 124f) with 6 apical cells; infuscation present at distal end of vein 2A and adjacent part of ambient vein; infuscation absent from ambient vein ignoring region in vicinity of vein 2A; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 124e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbal* covers absent; timbals with 3 long ribs spanning the full height of the timbal (and 1 or 2 others not so long), spanning the full height of the timbal, spaced with intermediate short ribs; basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so and not broadly rounded; timbals not extended below wing bases.

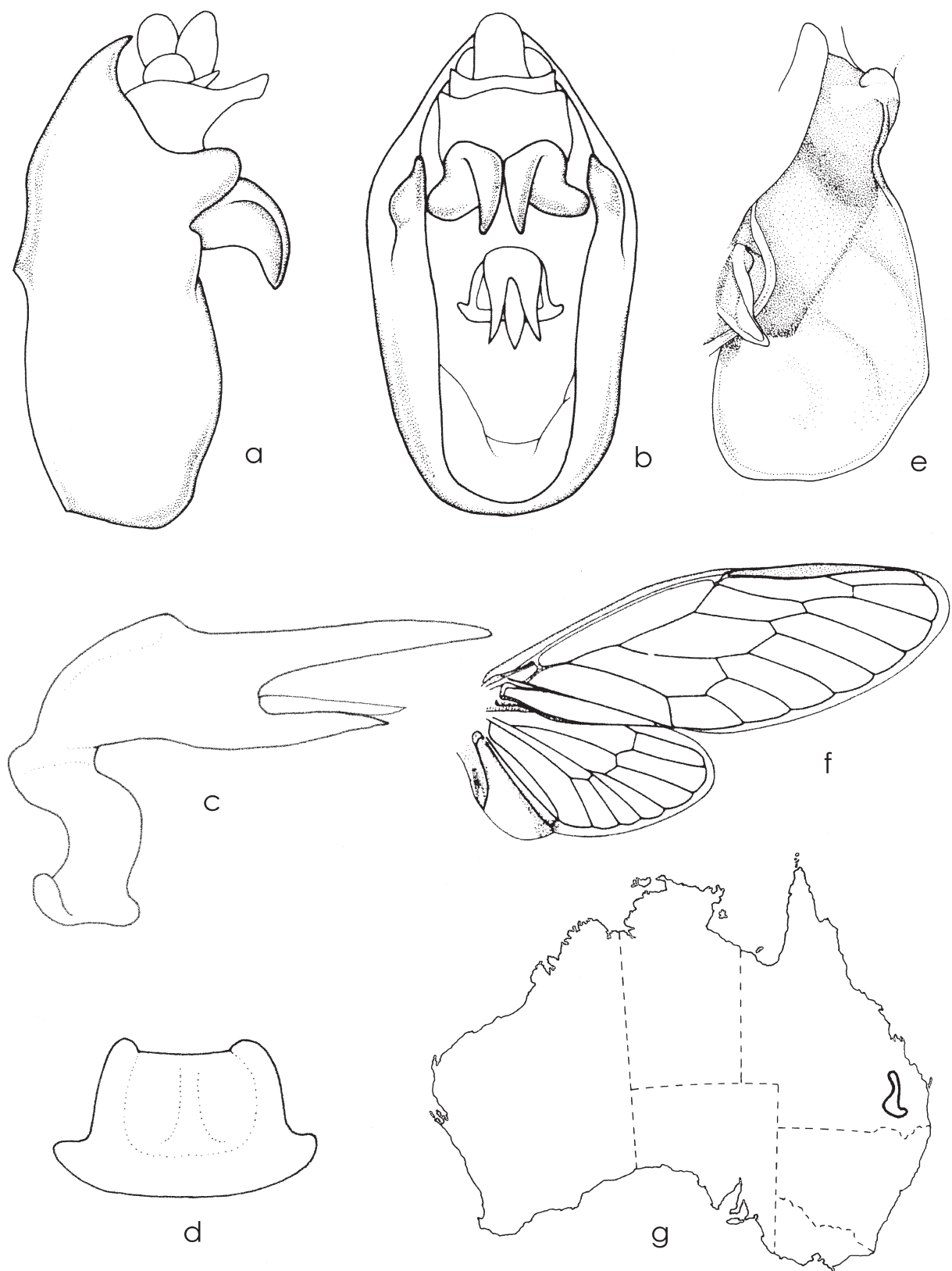
*Male genitalia* (Figs 124a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view short and broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge', entirely fleshy; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for their entire length, in lateral view aligned with thecal shaft for much of its length with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Very small cicadas (Pl. 2, fig. 3). Distinguished from all other Australian genera except *Caliginopsalta* by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, the paranota confluent with adjoining sclerites of the pronotum, no mid lateral tooth on the paranotum and the hind wing ambient vein infuscated in the vicinity of vein 2A.

Clearly differs from *Pauropsalta* in the male genitalia which lack the very large upper pygofer lobes so characteristic of *Pauropsalta*. Further, the aedeagus has a typically 'trifid' theca exposing a fleshy endotheca, and the aedeagal hinge lacks a chitinous back and is entirely fleshy.





**FIGURE 124.** Genus *Caliginopsalta* Ewart: (a) *C. percola* Ewart, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, male operculum; (f) the same, fore and hind wings; (g) generic distribution.



**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Ewart (2005a) provides detailed notes on the single described species in this genus including an analysis of its song.

### Genus *CHELAPSALTA* gen. n.

**Type species:** *Cicada puer* Walker, 1850 (Pl. 2, fig. 5).

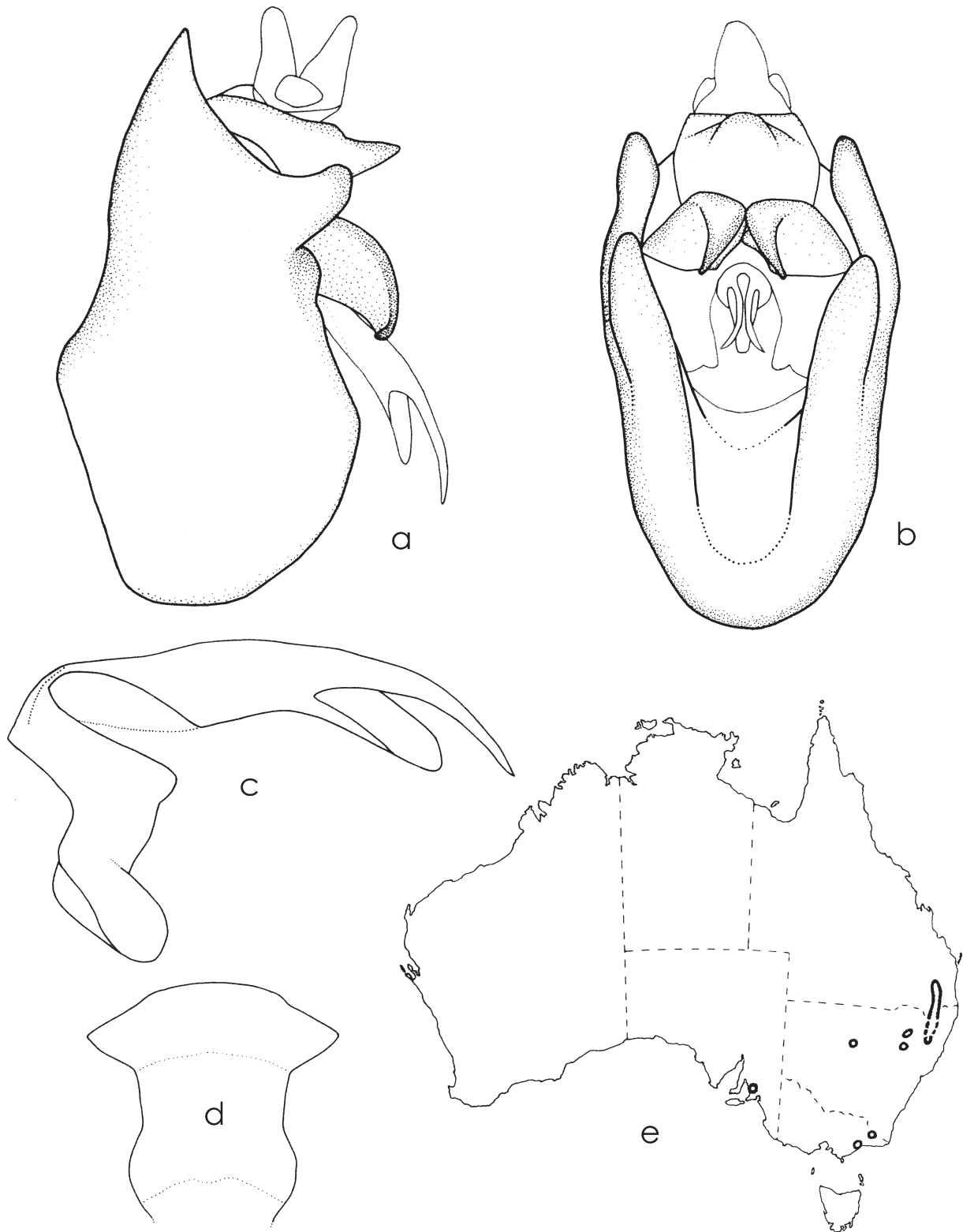
**Included species:** AUSTRALIAN: *puer* (Walker, 1850), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *chelo*, meaning claw and referring to the claw-like claspers of the male genitalia, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 125e): The mountains of south-eastern Queensland south from the Bunya Mountains, the mountains of northern New South Wales, near Cobar in western New South Wales, eastern Victoria on the Mitchell River (Dunn 1991) and upper Snowy River, and in South Australia in the vicinity of Adelaide.

**Diagnosis.** *Head* including eyes about as wide or wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view narrowing towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum; metanotum partly visible at dorsal midline. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscations usually at bases of apical cells 2 and 3 but sometimes absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* usually with 6 apical cells but sometimes 5 (often only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting; base (remnant of epimeron 3) normal. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 125a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft curved in a



**FIGURE 125.** Genus *Chelapsalta* **gen. n.:** (a) *C. puer* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution.

gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, no more than about half the length of pseudoparameres; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from all other Australian genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, hind wings with 6 apical cells, paranota confluent with adjoining pronotal sclerites and lacking a mid lateral tooth, a pronotum that narrows towards the posterior and eyes that are large (together making about half the width of the head). The single species currently known from this genus has a characteristic silvery dorsal midline along the abdomen (Pl. 2, fig 5).

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, and claspers that are claw-like with diverging distal ends.

Distinguished from the closely allied *Simona sancta* by the shape of the pronotum that narrows towards the posterior. Further, the male of *S. sancta* has abdominal segment 2, where it forms the posterior margin of the timbal cavity, very angular; that of *C. puer* is very rounded.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.

*Chelapsalta puer* is very similar morphologically to *Simona sancta*, the only notable difference being the shape of the pronotum; that of *C. puer* narrows towards the posterior, that of *S. sancta* widens towards the posterior. Molecular studies by Hill, Marshall, Simon, *et al.* (pers. comm.) support the generic separation of these two species because at least one other well defined genus separates them phylogenetically. It is for this reason I place them here in separate genera. Further notes on molecular relationships of *C. puer* are provided by Arensburg, *et al.* (2004a) and Buckley, *et al.* (2002). Notes on seasonality are provided by Coombs (1996). Notes on habitat are provided by Popple & Strange (2002).

## Genus *CHLOROCYSTA* Westwood

*Cystosoma* (*Chlorocysta*) Westwood, 1851: 208; Walker, 1852: 1133.

*Chlorocysta* Stål, 1863a: 575; Marshall, 1873: 358; Distant, 1882: 125; Distant, 1892: 151; Kirby 1896: 458; Goding and Froggatt, 1904: 566, 596, 658; Distant, 1905f: 213, 215; Distant, 1906d: 153, 159; Froggatt, 1907: 352; Horváth 1913: 429; Handlirsch, 1925: 1116; Tillyard, 1926: 161; Schulze, Kükenthal and Heider, 1926–40: 668; Imhof, 1929: 794; Myers, 1929b: 134; Kato, 1932: 15, 184, 185; Imhof, 1933: 306; Neave, 1939a: 707; Orian, 1954: 233; Kato, 1956: 70, 79, 84; Burns, 1957: 643; Boulard, 1979a: 35; Duffels and van der Laan, 1985: 248; Moulds, 1990: 185; de Boer, 1990: 64; de Boer, 1991: 2, 3; de Boer, 1992a: 164; de Boer, 1992b: 18, 19, 20, 22; de Boer, 1993a: 16, 17, 18; de Boer, 1993b: 142; de Boer, 1994a: 3; de Boer, 1995a: 4, 8, 24; de Boer, 1995b: 214, 215; de Boer, 1995c: 2, 6; de Boer, 1995d: 218, 219, 222, 224, 225, 233; de Boer, 1996: 352, 354; de Boer and Duffels, 1996a: 155, 168, 170, 171; de Boer and Duffels, 1996b: 301, 304, 314; de Boer, 1997: 91, 92, 93, 96, 97, 98, 107, 109; Moulds, 2005a: 390, 413, 430, 435.

*Mardalana* Distant, 1905f: 213, 215; Distant, 1906d: 154, 159; Horváth, 1913: 429; Ashton 1914a: 351; Schulze, Kükenthal and Heider, 1926–40: 1970; Kato, 1932: 184; Neave, 1940a: 43; Burns, 1957: 643; Metcalf, 1963: 257; Duffels and van der Laan, 1985: 249; Moulds, 1990: 185.

*Mardarana* [sic] Kato, 1932: 185; Kato, 1956: 70.

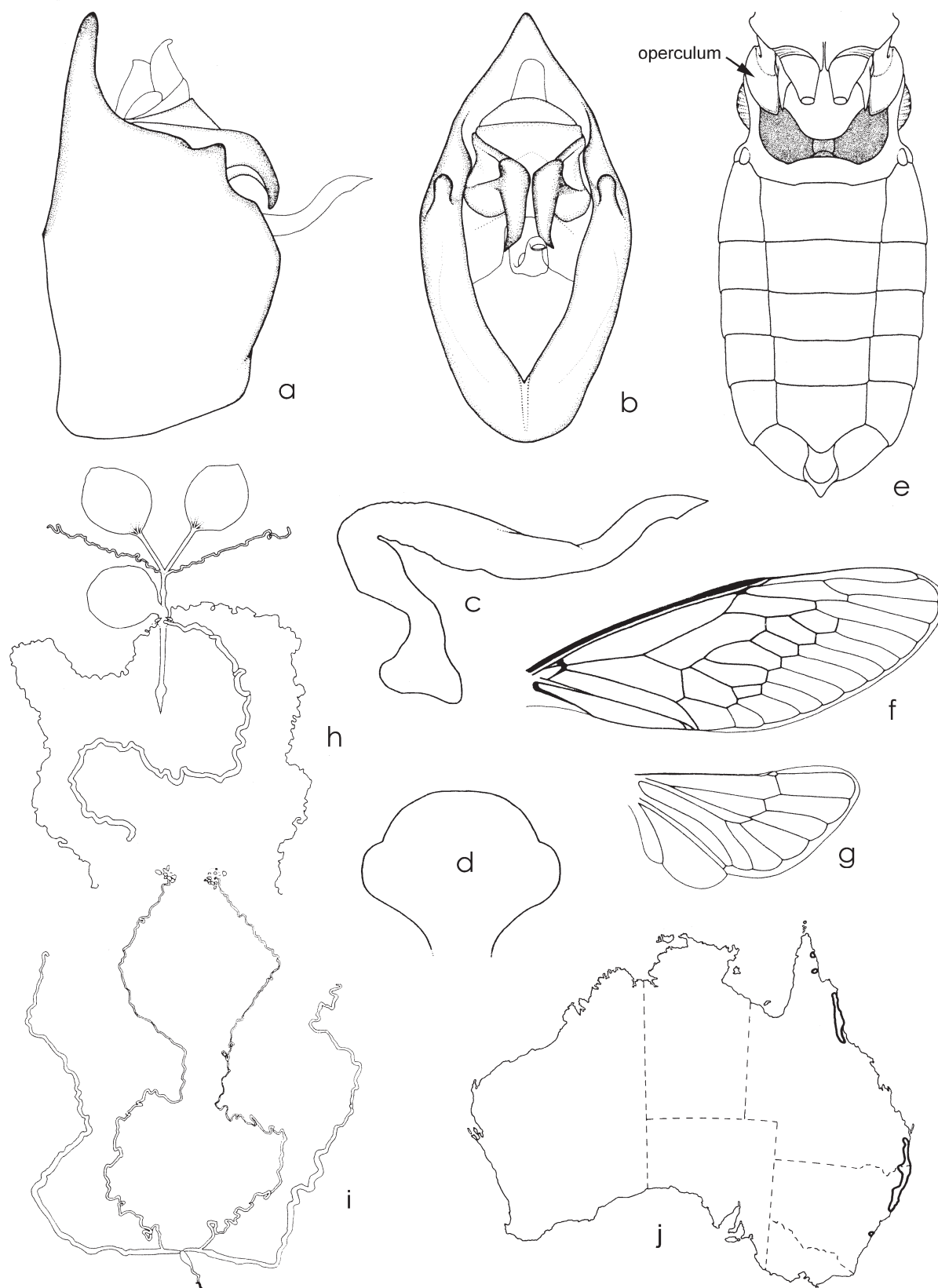
*Mardalena* [sic] Boulard, 1979a: 46.

The type species of *Chlorocysta* and *Mardalana* are synonymous, thus *Mardalana* falls as a junior objective synonym of *Chlorocysta* (Moulds, 1990: 185).

**Type species:** *Cystosoma* (*Chlorocysta*) *vitripennis* Westwood, 1851, by monotypy.

**Included species:** AUSTRALIAN: *fumea* (Ashton, 1914), *suffusa* (Distant, 1907), *vitripennis* (Westwood, 1851). OTHERS: none.

**Distribution** (Fig. 126j): North-eastern Queensland, south-eastern Queensland and the North Coast of NSW and introduced to Sydney (Moulds 1990).



**FIGURE 126.** Genus *Chlorocysta* Westwood: (a) *C. vitripennis* (Westwood), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, underside of male body showing opercula; (f) the same, right fore wing; (g) the same, right hind wing; (h) *C. suffusa* (Distant), male reproductive system, dissection with aedeagus removed from pygofer; (i) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (j) generic distribution.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate nearly meeting eye; postclypeus transversely angulate along ventral midline; cross-section, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 126f) hyaline; with 12 apical cells (sometimes 11 or 13 if aberrant, but usually so only in one wing); a series of approximately 6 subapical cells; ulnar cell 3 substantially parallel to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma absent; vein CuA nearly straight so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation absent; wing outer margin narrow but developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 126g) with 5 apical cells (sometimes 6 or 4 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 126e) distant from lateral margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically tapering to a blunt point, inner margin straight, clearly not meeting. *Male abdomen* (Fig. 126e) markedly inflated and almost entirely hollow; tergites in cross-section with sides concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs many and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 126a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 126h) with accessory glands long.

*Female reproductive system* (Fig. 126i) ditrysian; length of accessory glands long.

**Distinguishing characters.** Small to medium-sized cicadas. Differs from all other genera in having a combination of fore wings with 12 apical cells (11 or 13 if aberrant, but usually so only in one wing), a series of subapical cells and a narrow margin, and hind wings normally with 5 apical cells (6 or 4 if aberrant, but rarely aberrant in more than one wing). The wing venation is clearly unlike that of any other Australian genus except *Glaucopsaltria*, which differs in normally having 13 fore wing apical cells and 6 hind wing apical cells. Males also differ from *Glaucopsaltria* in having tergite 7 similar in size to its other tergites whereas that of *Glaucopsaltria* is greatly enlarged.

The claspers of the male genitalia are well developed, claw-like with diverging apices; the theca is S-shaped and typical of the Chlorocystini.

**Discussion.** De Boer (1995b) defined this genus and discussed its phylogenetic relationships. Phylogenetic relationships are also documented in Moulds (2005a) in a cladistic analysis. Moulds (1990) summarises the known distributions and biology of the Australian species. Ewart (1995) provides notes on *C. vitripennis* and a song analysis.

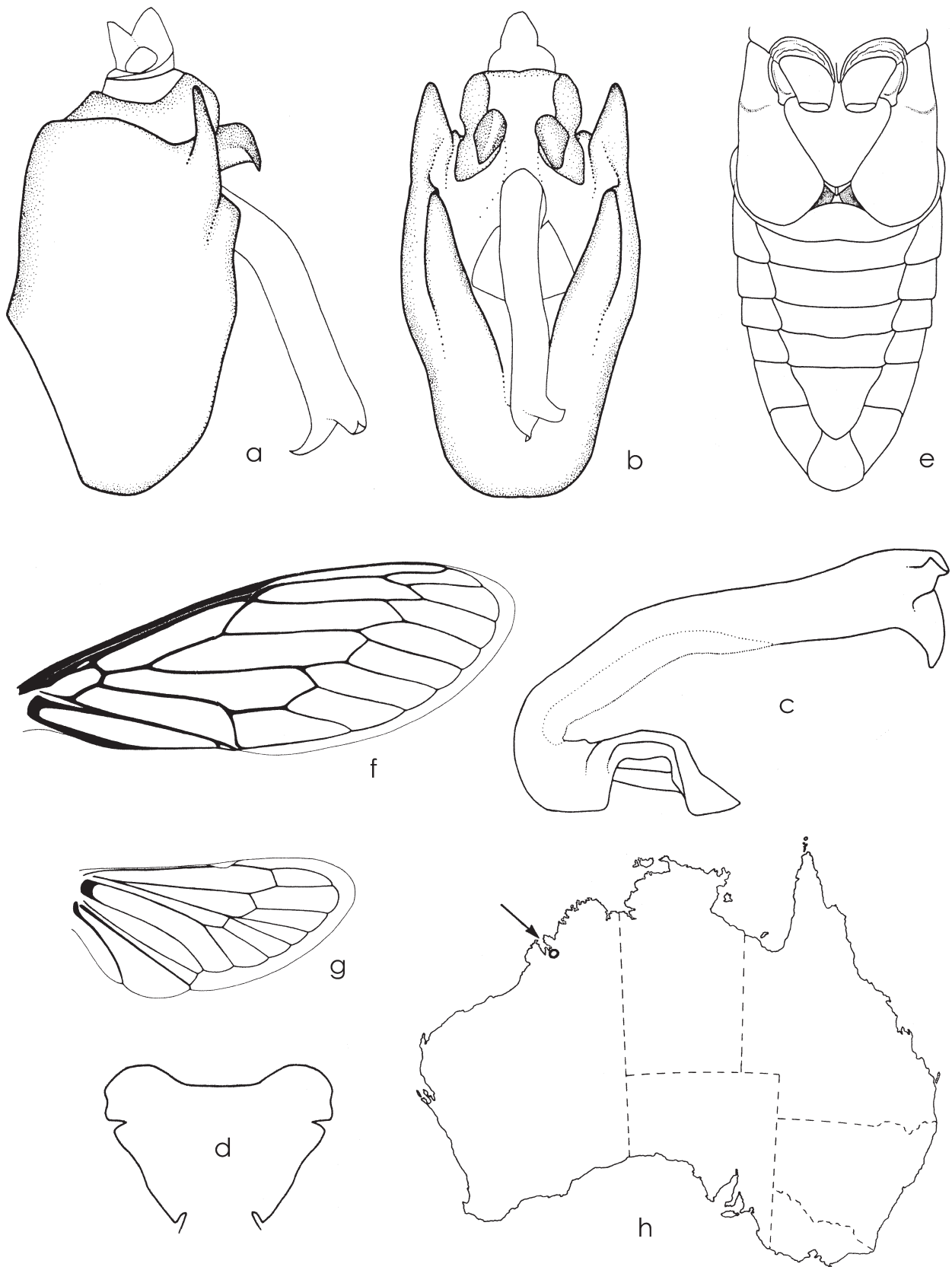
### Genus *CHRYSOCICADA* Boulard

*Chrysocicada* Boulard, 1989: 67–68; Boulard, 1990: 238; Moulds, 2005a: 377, 392, 430, 437.

**Type species:** *Chrysocicada franceaustraliae* Boulard, 1989, by original designation (Pl. 1, fig. 5).

**Included species:** AUSTRALIAN: *franceaustraliae* Boulard, 1989. OTHERS: none.





**FIGURE 127.** Genus *Chrysocicada* Boulard: (a) *C. franceaustraliae* Boulard, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, underside of male body showing opercula; (f) the same, right fore wing; (g) the same, right hind wing; (h) generic distribution.



**Distribution** (Fig. 127h): Far western Kimberley region, Western Australia (Boulard 1989, 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 127f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA nearly straight so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 127g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 127e) tending to be linear, both outer and inner margins straight, distal margin broadly rounded, reaching distal margin of tympanal cavity, not meeting. *Male abdomen* (Fig. 127e) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section flat except for upwardly tilted margin. *Timbal* covers absent; timbal ribs many and regular in size and closely spaced filling entire timbal area apart from small basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 127a–d). Pygofer with distal shoulders not developed; upper lobes tending to be flat, small to moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak absent. Uncus absent. Claspers large, dominant, widely separated, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view basally divided into two discs with apical arms lobe-like; basal portion of basal plate directed forwards away from thecal shaft; ventral rib rod-like with attachment only at ends; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through some 140°; pseudoparameres absent; thecal ventral surface lacking chitinization for its length; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. The uniformly light ochre body coloration with greenish tinges (Pl. 1, fig. 5), together with the separation of fore wing veins M and CuA at the basal cell, and relatively short fore wing apical cells (compared to ulnar cells), clearly separate *Chrysocicada* from any other Australian genus. The male aedeagus is very distinct; the apex of the theca is forked and terminates in a pair of stout, fleshy, pointed lobes and its ventral surface lacks sclerotization.

**Discussion.** Phylogenetic relationships are documented by Moulds (2005a) in a cladistic analysis. Boulard (1989) considers *Chrysocicada* to be allied to *Quintilia* Stål but gives no reason for this decision except that "it differs in the shape of the abdomen and that of the genitalia". Notes on the biology and song of *C. franceaustraliae* are provided by Boulard (1989, 1990).

## Genus *CICADETTA* Kolenati

**Type species:** *Cicada montana* Scopoli, 1772, by subsequent designation.

Boulard (1988, 1998) and Moulds (1988) concluded that the authorship and date of publication of the genus *Cicadetta* originates from Amyot (1847). However, subsequently the International Commission on Zoological Nomenclature suppressed Amyot's 1847 work (Opinion 2165) making the names in it unavailable for nomenclatorial purposes. The name *Cicadetta* now dates from Kolenati (1857). The type species of *Cicadetta*, *C. montana* Scopoli, remains unchanged.

**Included species:** AUSTRALIAN: none; all Australian species either fall into synonymy or are here transferred to other genera (see below). OTHERS: many species occurring in all faunal regions except the Neotropics.

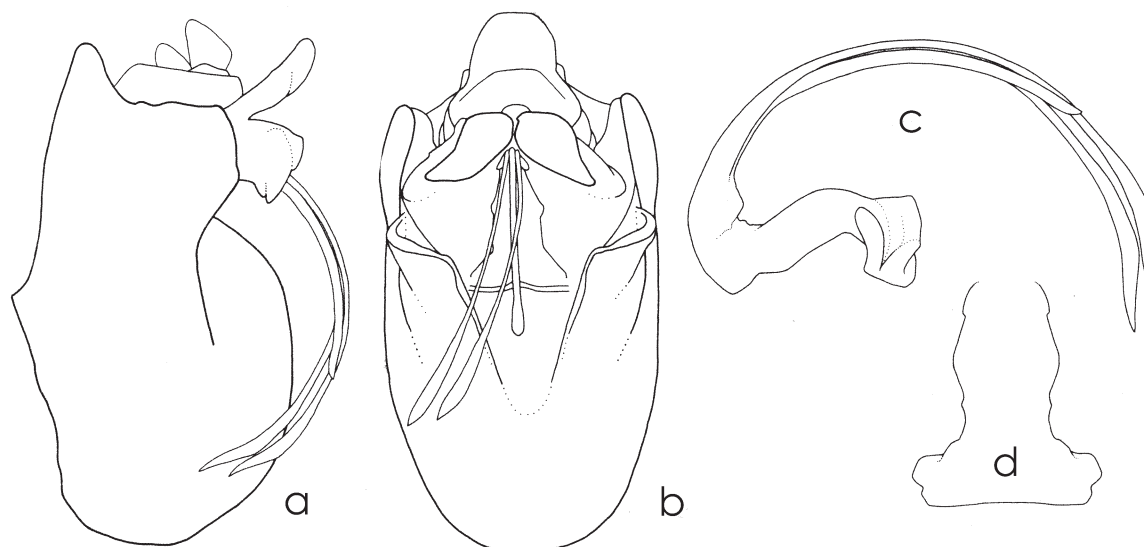
**New synonymies:** The following names fall into synonymy.

*capistrata* (Ashton), see *Taurella forresti* (Distant)  
*fulva* (Goding and Froggatt), see *Birrima castanea* (Goding and Froggatt)  
*murrayensis* (Distant), see *Plerapsalta incipiens* (Walker)  
*nebulosa* (Goding and Froggatt), see *Pauropsalta rubea* (Goding and Froggatt)  
*singula* (Walker), see *Plerapsalta multifascia* (Walker)  
*spretta* (Goding and Froggatt), see *Gelidea torrida* (Erichson)  
*subgulosa* (Ashton), see *Simona sancta* (Distant)  
*sulcata* (Distant, 1907), see *Taurella froggatti* (Distant)  
*warburtoni* (Distant), see *Taurella forresti* (Distant)

**Excluded species:** All Australian species currently included in *Cicadetta* are here transferred to other genera as follows.

*aaede* (Walker, 1850) to *Yoyetta* **gen. n.**  
*abdominalis* (Distant, 1892) to *Yoyetta* **gen. n.**  
*adelaida* (Ashton, 1914) to *Clinopsalta* **gen. n.**  
*apicata* (Ashton, 1914) to *Kobonga*  
*arenaria* (Distant, 1907) to *Sylphoides* **gen. n.**  
*binotata* (Goding and Froggatt, 1904) to *Myopsalta* **gen. n.**  
*brevis* (Ashton, 1912) to *Ewartia* **gen. n.**  
*celis* Moulds, 1988 to *Yoyetta* **gen. n.**  
*convergens* (Walker, 1850) to *Physeema* **gen. n.**  
*crucifera* (Ashton, 1912) to *Myopsalta* **gen. n.**  
*cuensis* (Distant, 1913) to *Ewartia* **gen. n.**  
*denisoni* (Distant, 1893) to *Yoyetta* **gen. n.**  
*forresti* (Distant, 1882) to *Taurella* **gen. n.**  
*froggatti* (Distant, 1907) to *Taurella* **gen. n.**  
*graminis* (Goding and Froggatt, 1904) to *Neopunia* **gen. n.**  
*hackeri* (Distant, 1915) to *Telmapsalta* **gen. n.**  
*hermannsburgensis* (Distant, 1907) to *Erempsalta* **gen. n.**  
*hunterorum* Moulds, 1988 to *Yoyetta* **gen. n.**  
*incepta* (Walker, 1850) to *Yoyetta* **gen. n.**  
*incipiens* (Walker, 1850) to *Plerapsalta* **gen. n.**  
*issoides* (Distant, 1905) to *Noongara* **gen. n.**  
*juncta* (Walker, 1850), not Australian, see below.  
*labeculata* (Distant, 1892) to *Galanga* **gen. n.**  
*labyrinthica* (Walker, 1850) to *Physeema* **gen. n.**  
*lactea* (Distant, 1905) to *Myopsalta* **gen. n.**  
*landsboroughi* (Distant, 1882) to *Yoyetta* **gen. n.**  
*latorea* (Walker, 1850) to *Physeema* **gen. n.**  
*mackinlayi* (Distant, 1882) to *Myopsalta* **gen. n.**  
*melete* (Walker, 1850) to *Pyropsalta* **gen. n.**  
*minima* (Goding and Froggatt, 1904) to *Punia* **gen. n.**  
*mixta* (Distant, 1914) to *Platypsalta* **gen. n.**  
*multifascia* (Walker, 1850) to *Plerapsalta*  
*oldfieldi* (Distant, 1883) to *Ewartia* **gen. n.**  
*polita* Popple, 2003 to *Heliopsalta* **gen. n.**  
*puer* (Walker, 1850) to *Chelapsalta* **gen. n.**  
*quadrincta* (Walker, 1850) to *Physeema* **gen. n.**  
*sancta* (Distant, 1913) to *Simona* **gen. n.**  
*spinosa* (Goding and Froggatt, 1904) to *Auscala* **gen. n.**  
*stradbrokensensis* (Distant, 1915) to *Limnopsalta* **gen. n.**

*tigris* (Ashton 1914) to *Clinopsalta* **gen. n.**  
*toowoombae* (Distant, 1915) to *Yoyetta* **gen. n.**  
*torrida* (Erichson, 1842) to *Gelidea* **gen. n.**  
*tristrigata* (Goding and Froggatt, 1904) to *Yoyetta* **gen. n.**  
*viridis* (Ashton, 1912) to *Taurella* **gen. n.**  
*waterhousei* (Distant, 1905) to *Myopsalta* **gen. n.**



**FIGURE 128.** Genus *Cicadetta* Kolenati: (a) *C. montana* (Scopoli), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom.

**Distinguishing characters.** Small cicadas. The stems of fore wing veins M and CuA leave the basal cell adjacent to one another, but not fused as one. Male genitalia (Figs 128a–d) provide the definitive characterisation: the basal lobes of the male pygofer are not rounded lobes but wall-like extensions of the pygofer, and the pseudoparameres of the aedeagus are exceedingly long, surpassing the distal end of the theca by about half its length.

No Australian species fulfills these criteria.

**Discussion.** The genus *Cicadetta*, until relatively recent times, has been loosely defined and used to accommodate many species of Cicadettini that did not fit within other genera of the tribe. The Australian species currently placed in *Cicadetta* were included as a direct consequence of this approach. The placement of most precedes the catalogue of Goding and Froggatt (1904) and few have received consideration since. Further, the genus *Melampsalta* Kolenati also fell within the definition of *Cicadetta* and for many years the two names were considered synonymous. There was also confusion concerning the type species of both *Cicadetta* and *Melampsalta* and their priority in synonymy. Consequently some authors believed *Melampsalta* to be the senior synonym, others the junior. There is now wide acceptance that these genera are not synonymous but each a legitimate genus. Australian species were temporarily retained in *Cicadetta* (Moulds 1990) as none was found to belong to *Melampsalta*; some closely resembled *Cicadetta* while some represented new genera (Moulds 1988). Here all Australian species in *Cicadetta* are transferred to other genera, mostly to new genera described in this work.

The type species of *Cicadetta*, *C. montana*, is included in the phylogenetic analysis of Moulds (2005a).

## Review of selected species

### *Cicadetta juncta* (Walker)

*Cicada juncta* Walker, 1850: 176

*Melampsalta juncta* (Walker): Stål, 1862: 484

*Cicadetta juncta* (Walker): Metcalf, 1963: 321

*Type*: Holotype female, bearing handwritten label 'C. juncta Walker.', printed label '817' and printed circular label edged green 'Type'. Examined.

Walker's original description gives the locality as unknown and the type bears no locality label. However, Burns (1957) included the species in his catalogue of Australian cicadas and added the locality "Austr." but without providing an explanation for doing so. Moulds (1990) included the species as doubtfully from Australia. This species is known only from the type specimen.

Within the Australian fauna the size, uniform green colouration and general appearance of *Cicadetta juncta* is closest to *Taurella viridis* (Ashton), *Ewartia cuensis* (Distant), *Pipilopsalta ceuthoviridis* Ewart and *Erempsalta hermannsburgensis* (Distant). *C. juncta* differs from *Taurella viridis* in the length of the fusion of fore wing veins M and CuA which is much shorter, the fore wing basal membrane which is orange rather than grey and the eyes protrude less from the head. It differs from *Ewartia cuensis* in its much smaller size (fore wing length 16.8 mm compared to 19 mm for the smallest *E. cuensis*), and its more rounded fore wing shape. It differs from *P. ceuthoviridis* in its larger size (fore wing length 16.8 compared to the largest *P. ceuthoviridis* of about 15 mm) and its shorter ovipositor. For the most part *C. juncta* is significantly smaller than *Erempsalta hermannsburgensis*, the body is more slender and less robust and mostly the head is broader with *E. hermannsburgensis* having a head narrower than the mesothorax. Nor does it match some other green cicadas found in Australia that remain undescribed. On balance it is unlikely that *C. juncta* belongs to the Australian fauna and I exclude it from this review.

### Genus *CLINATA* gen. n.

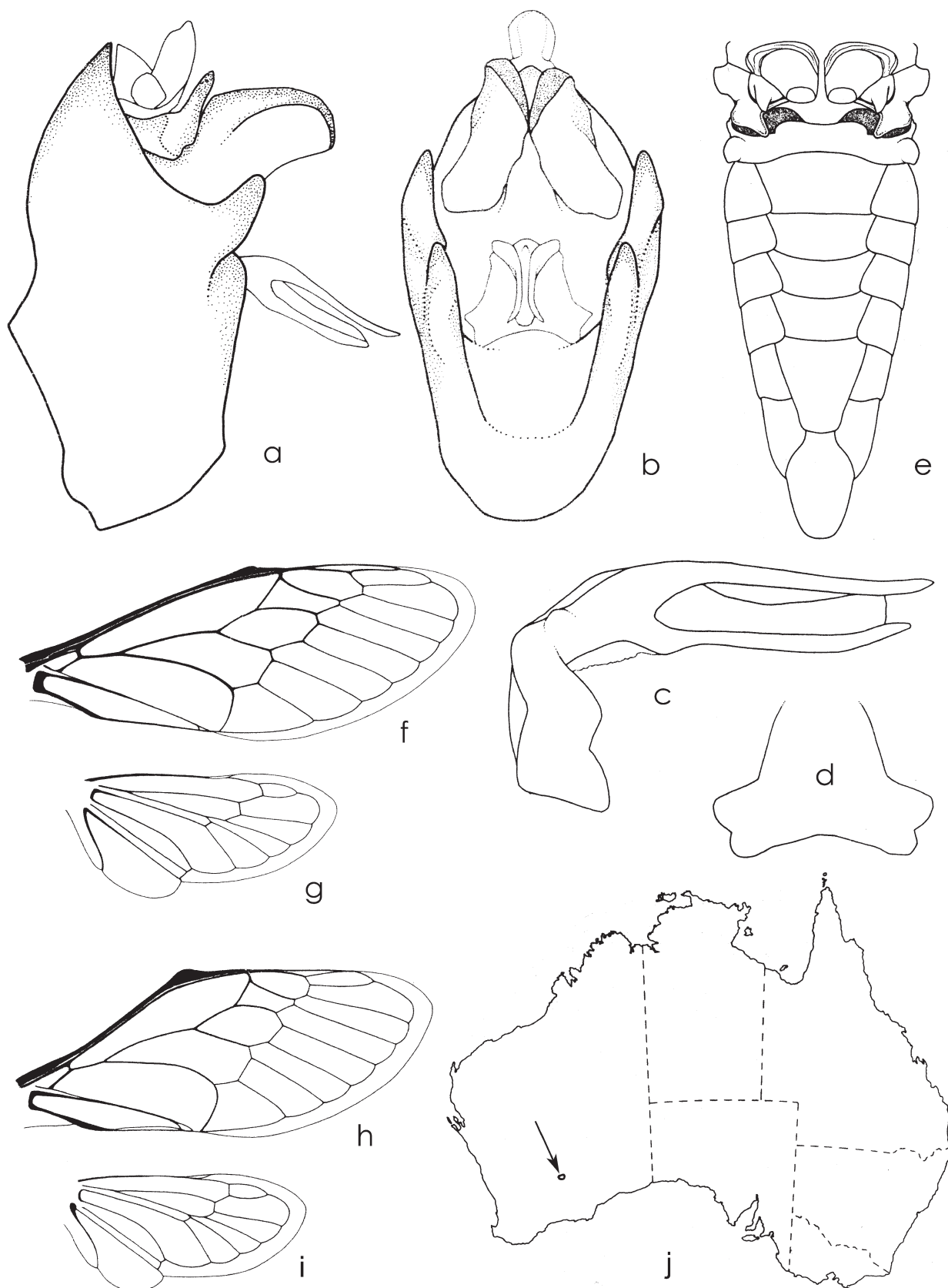
**Type species:** *Pauropsalta nodicosta* Goding and Froggatt, 1904 (Pl. 2, figs 16a, 16b).

**Included species:** AUSTRALIA: *nodicosta* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *clinatus* meaning bent or sloping and referring to the bent fore wing costa. Feminine.

**Distribution** (Fig. 129j): Known only from Kalgoorlie, Western Australia (Moulds 1990).

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Figs 129f, h) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa with a characteristic nodule-like swelling a little proximal of node giving costa an angular appearance, costa of male strongly bowed on distal half; pterostigma present; vein CuA strongly bowed in male, nearly straight in female but cubital cell in both larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell very long (about equal to or longer than distance from its apex to wing tip); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Figs 129g, i) with 5 apical cells (sometimes 6 or 4 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 129e) small, very narrow, development towards abdominal midline, far from distal margin of tympanal cavity, far from meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 129e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbal* covers absent; timbal ribs effectively absent and timbals probably non-functional; basal dome large; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals small, not extended below wing bases.



**FIGURE 129.** Genus *Clinata* gen.n.: (a) *C. nodicosta* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, underside of male body showing opercula; (f) the same, female fore wing; (g) the same, female hind wing; (h) the same male fore wing; (i) the same, male hind wing; (j) generic distribution.



*Male genitalia* (Figs 129a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, moderately tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view as long as or longer than broad, apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; large, visible in lateral view; thecal shaft straight; pseudoparameres present, dorsal of theca and originating distal of, but near, thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, very long (about as long as pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesicle opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small, dominantly black cicadas (Pl. 2, figs 16a, 16b). Clearly distinguished from all other Australian genera except *Toxala* by the angular fore wing and the characteristically swollen costa proximal of node. Unlike *Toxala*, fore wing ulnar cells 1–3 are all similar in length, and the hind wings have 5 apical cells (4 or 6 if aberrant). Male timbals are small with the ribs effectively absent leaving only the basal plate. The timbal cavities do not extend below the level of the wings. The male opercula are also greatly reduced.

The male genitalia possess a distinctive aedeagus with 'trifid' theca exposing a fleshy endotheca, but which has exceedingly long pseudoparameres and an exceedingly long ventral support that almost reaches the distal ends of the pseudoparameres; the only other genus within the Australian fauna possessing a similar aedeagus is *Toxala*.

**Discussion.** The phylogenetic relationships of this genus have been documented by Moulds (2005a) in a cladistic analysis and in the introductory section of this paper.

### Genus *CLINOPSALTA* gen. n.

**Type species:** *Melampsalta adelaida* Ashton, 1914 (Pl. 1, figs 3a, 3b).

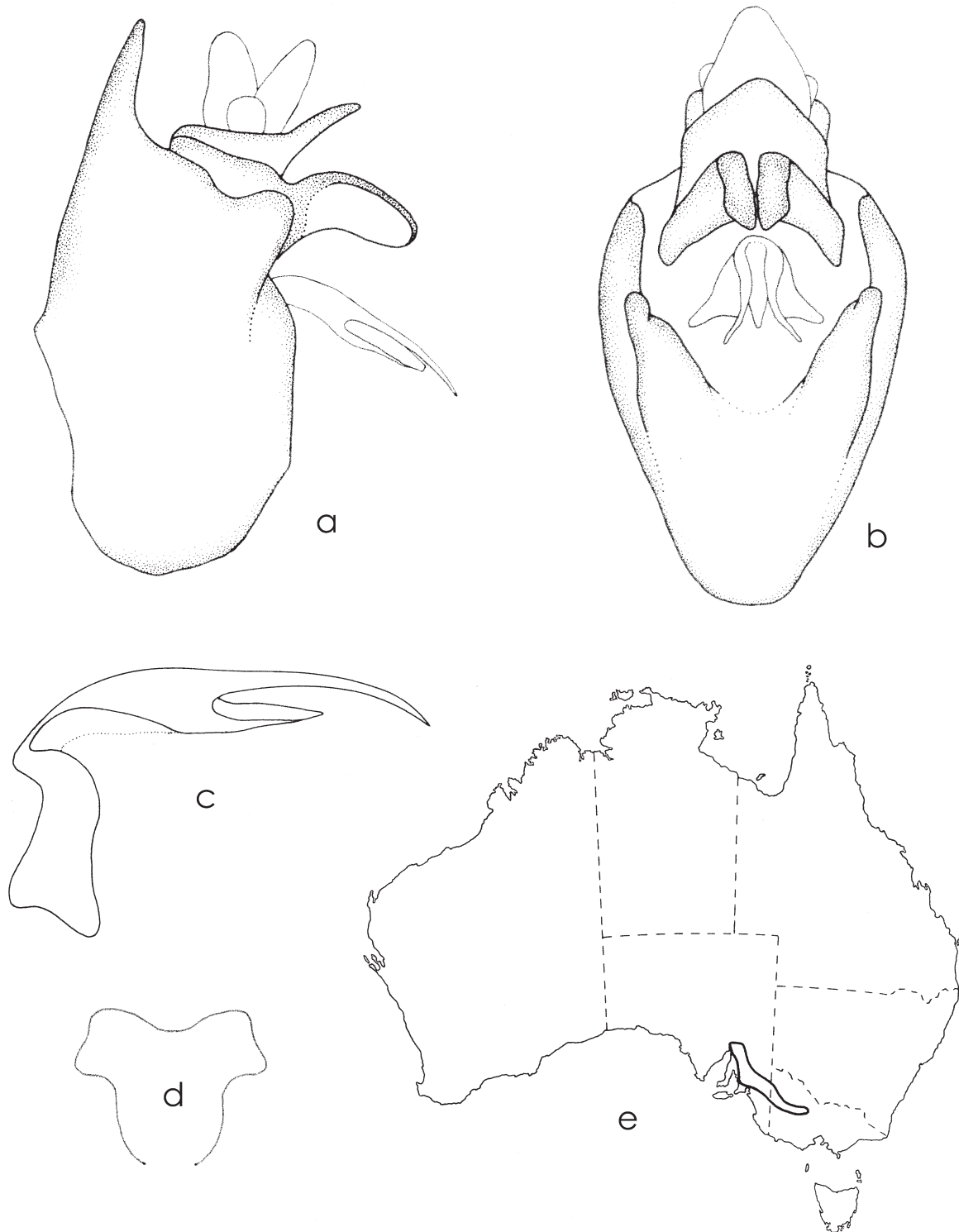
**Included species:** AUSTRALIAN: *adelaida* (Ashton, 1914), **comb. n.**, *tigris* (Ashton, 1914), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *clino* meaning bend and referring to the bent fore wing costa of the type species, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 130e): South-eastern Australia south from Horrocks Pass to Inglewood in central Victoria (Moulds, 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, usually with a mid lateral tooth but missing in some individuals; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male strongly bowed on distal half; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP





**FIGURE 130.** Genus *Clinopsalta* **gen. n.**: (a) *C. adelaida* (Ashton), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution.

and 1A fused in part; distance between cross veins and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell shorter than the distance from its apex to wing tip; infuscation either absent or present on crossveins r and r-m; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long,

separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII convex in cross-section, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases. Timbal covers absent.

*Male genitalia* (Figs 130a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, narrow in lateral view, the outer face with an overhanging lip along margin; fused around midlength; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, fused around midlength, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished by having the combination of fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the paranota having a small mid lateral tooth, the fore wing costa strongly bowed on distal half (Pl. 1, figs 3a, 3b), and the timbals with 3 long ribs spanning the full height of the timbal (plus 1 or 2 others not so long).

The male genitalia an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, but the claspers are fused at about midlength; in lateral view the claspers are essentially flat, narrow in lateral view and with an overhanging lip along their outer margin.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.

### Genus *CROTOPSALTA* Ewart

*Crotopsalta* Ewart 2005a: 441–442.

**Type species:** *Crotopsalta plexis* Ewart, 2005, by original designation (Pl. 2, fig. 2).

**Included species:** AUSTRALIAN: *fronsectes* Ewart, 2005; *leptotigris* Ewart, 2009; *plexis* Ewart, 2005; *poaecetes* Ewart, 2005; *strenulum* Ewart, 2005. OTHERS: none.

**Distribution** (Fig. 131g): Northern-western Queensland from around Cloncurry and Dajarra, south-western Queensland in the north-eastern Simpson Desert, eastern Queensland south from the Mackay district and inland as far as Barcaldine and in New South Wales near Warialda (Ewart 2005a, 2009b).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and

'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 131f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costa costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 131f) with 6 apical cells except in *leptotigris* that has 5; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 131e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; not extended below wing bases; timbal covers absent.

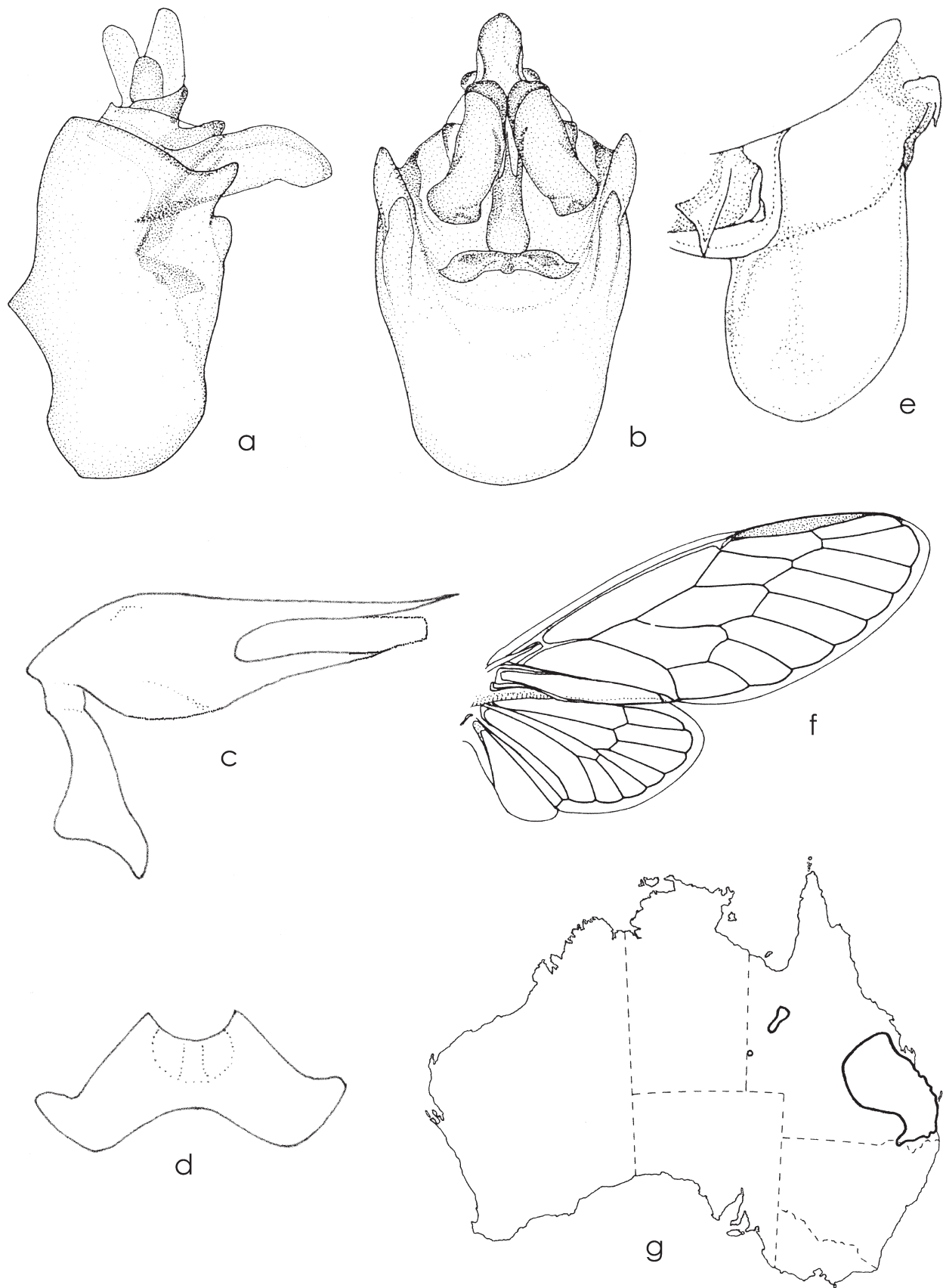
*Male genitalia* (Figs 131a–d). Pygofer in ventral view very wide across upper lobes and thereafter strongly tapered to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak with no spine or pointed apex, completely straight or broadly curved across apical region. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, narrow in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus typically 'trifid' with an exposed endotheca, a basal plate that in lateral view is undulated, weakly depressed on dorsal midline, while in dorsal view is exceedingly short, almost without length and apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* lacking a spine or apical point, completely straight or broadly curved across apical region. *Female reproductive system* unknown.

**Distinguishing characters.** Small to very small cicadas (Pl. 2 fig. 2). Distinguished from all other genera by having a combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, the paranota confluent with adjoining pronotal sclerites and lacking a mid lateral tooth, and the male pygofer having no dorsal beak or apical point.

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, a very short basal plate, and claspers that are essentially flat and narrow in lateral view with an overhanging lip along the margin and that are distally parallel to each other in ventral view.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Figures of adults and notes on the distribution, habitat, behaviour and a detailed analysis of the song for all species except *C. leptotigris* are included in Ewart (2005a). Similar details for *C. leptotigris* can be found in Ewart (2009b) together with a key to all described species.



**FIGURE 131.** Genus *Crotopsalta* Ewart: (a) *C. plexis* Ewart, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) left male operculum (f) the same, fore and hind wings; (g) generic distribution.

## Genus *CYCLOCHILA* Amyot and Serville

*Cyclochila* Amyot and Serville, 1843: 470; Westwood, 1843: 33; Agassiz, Erichson and Germar, 1846: 4; Blanchard, 1846: 494; Agassiz, 1848: 316; Spinola, 1850: 50; Walker, 1850: 44, 258; Desmarest, 1859: 203; Dohrn, 1859: 72; Stål, 1862b: 18; Stål, 1866a: 3; McCoy, 1880: 57; Distant, 1882: 125; Distant, 1892: 100; Kirby, 1896: 458; Kirkaldy, 1903b: 232; Distant, 1904a: 302, 303; Goding and Froggatt, 1904: 564, 567, 569; Imhof, 1905: 218, 223; Distant, 1906b: 148; Distant, 1906d: 27; Froggatt, 1907: 349; Ashton, 1912b: 23; Distant, 1912a: 22; Ashton, 1921: 92; Delétang, 1923: 611; Handlirsch, 1925: 1117; Schulze, Kükenthal and Heider, 1926–40: 872; Myers, 1929b: 123, 135; Kato, 1932: 9, 153; Neave, 1939a: 916; Metcalf, 1944: 153; Kato, 1956: 66, 79; Burns, 1957: 614; Burns, 1959: 39–44, pl. V; Metcalf, 1963: 145; Boulard, 1965: 800; Aidley and White, 1969: 182; Matsuda, 1970: 248, 267; Young, 1973: 378; Duffels and van der Laan, 1985: 51; Moulds, 1990: 61; Moulds, 2005a: 377, 387, 391, 413, 414, 423, 430–432.

*Cyclochida* [sic]; Ashton, 1914a: 346 (misspelling).

*Cychlochila* [sic]; Cooper, 1941: 295 (misspelling).

**Type species:** *Tettigonia australasiae* Donovan, 1805, by monotypy.

**Included species:** AUSTRALIAN: *australasiae* (Donovan, 1805), *virens* Distant, 1906. OTHERS: none.

**Distribution** (Fig. 133j): North-eastern Queensland and south-eastern Queensland through eastern NSW and Victoria to the far south-eastern corner of South Australia (Moulds 1990, Haywood 2006a).

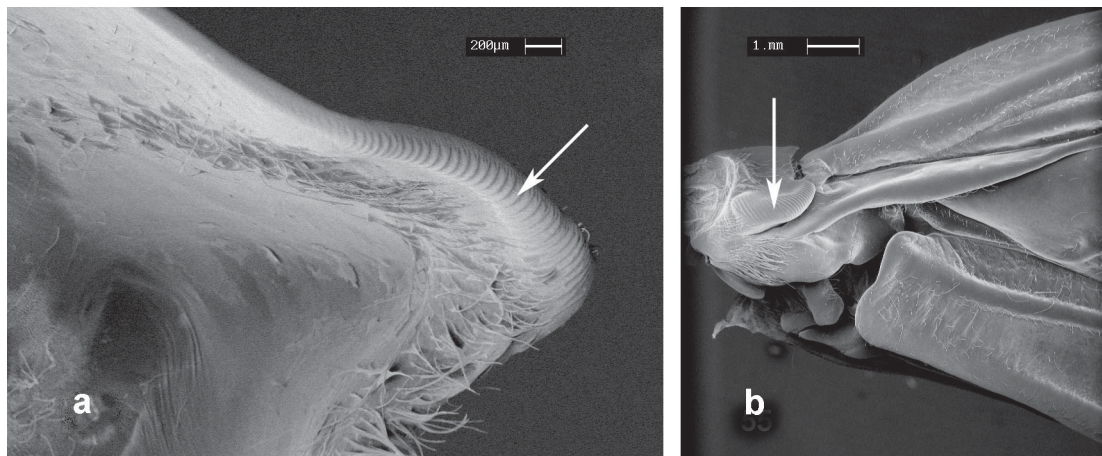
**Diagnosis.** *Head* including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline very broad, equal to width of lateral angles, underside of lateral angles with a ridged 'file' (Fig. 133a); paranota strongly ampliate, evenly rounded, horizontal in lateral view, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* (Fig. 133f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; C and R+Sc widely separated; costal margin anterior of costa strongly ampliate, reducing to node; pterostigma present; vein CuA straight so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein; basal sclerite ridged forming a scraper to interconnect with corresponding file on underside of pronotal collar (Fig. 132b). *Hind wings* (Fig. 133g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 133e) covering rim of distal margin of tympanal cavity, broadly rounded, reaching beyond level of tergite 2, overlapping. *Male abdomen* (Fig. 133e) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; sternites IV–VI in cross-section convex. *Timbal* covers present, flat, reduced dorsally and not quite reaching metathorax, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 133a–d). Pygofer with distal shoulders broad, rounded, the most distal part of pygofer; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinated pygofer (sometimes lacking in *C. australasiae*). Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short; base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinated, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 133h) with accessory glands long.

*Female reproductive system* (Fig. 133i) ditrysian; accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Large cicadas. *Cyclochila* shows a number of clear differences from all other Australian genera. It is unique amongst the Cicadoidea in having a stridulatory mechanism with a ridged file on the





**FIGURE 132.** *Cyclochila australasiae* (Donovan): (a) stridulatory file on underside of lateral angles of pronotal collar; (b) stridulatory scraper on fore wing base.

underside of the lateral angle of the pronotal collar that engages with a ridged scraper on the base of the fore wing to produce an audible sound (Figs 132a, b) (Moulds, 2005a: 414). The wide separation of C and R+Sc on the fore wing is unknown in all other Australian genera except *Tettigarcta*. *Cyclochila* also differs from all other Australian genera in clearly having the most distal part of the basal cell at the departure point of CuA. The male meracanthus is rudimentary and worm-like. The male reproductive system is extraordinary for its exceedingly long vas deferens and accessory glands which measure 320 mm and 270 mm respectively.

The two known species are usually leaf green in colour but sometimes yellow or orange. *C. australasiae* has additional colour forms including tan, turquoise and a distinctive form with a black abdomen and other black markings (Moulds 1990).

**Discussion.** Phylogenetic relationships of the genus are discussed in Moulds (2005a). *Cyclochila* is the sole representative of the tribe Cyclochilini. The wide separation of fore wing veins C and R+Sc, which is so pronounced in this genus (Fig. 133f) occurs infrequently in Cicadoidea. A perusal of some 200 world genera at my disposal revealed separation only in the African genera *Yanga* Distant and *Pycna* Amyot and Serville and in the Asian genera *Trengganua* Moulton and *Tosena* Amyot and Serville (*T. montivaga* Distant only), none of which is closely allied to *Cyclochila*. This assemblage of diverse genera all have a fore wing with a strongly ampliate costal margin anterior of the costa and all appear to be highly derived species.

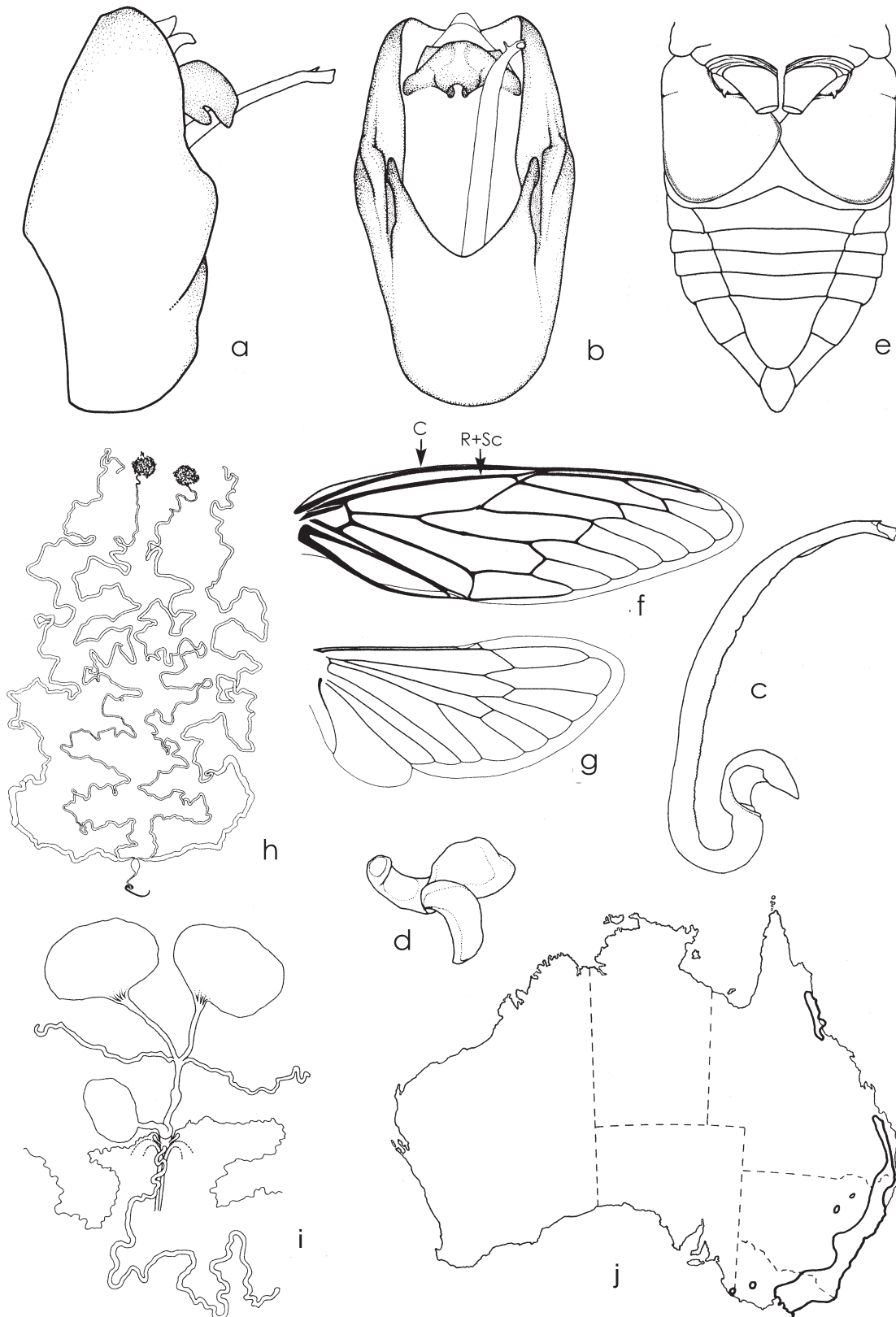
*Cyclochila* is unique among the Cicadoidea in possessing a stridulatory file on the underside of the lateral angles of the pronotal collar that interacts with a scraper on the fore wing base (Fig. 132). Rubbed together these produce low audible sound in hand-held specimens (K. Hill, pers. comm.), the purpose of which is for sexual communication at close quarters (J. Kentwell and B. Fryz, pers. comm.).

The species of *Cyclochila* have been reviewed by Moulds (1990). Song analyses of *C. australasiae* are provided by Ewart (1986) and Josephson & Young (1981). Discussion on acoustic mechanisms in *C. australasiae* are provided by Bennet-Clark (1997, 1999), Bennet-Clark & Daws (1999) and Bennet-Clark & Young (1992). Haywood (2006a) provides notes on the occurrence of *C. australasiae* in South Australia. Notes on seasonal occurrence and plant associations of *C. australasiae* in western Sydney are provided by Emery *et al.* (2005). Further notes on *C. australasiae* are provided by Coombs (1996) and Faithfull (2010).

### Genus *CYSTOPSALTRIA* Goding and Froggatt

*Cystopsaltria* Goding and Froggatt, 1904: 566, 595, 661; Distant, 1905f: 213, 216; Distant, 1906d: 154, 160; Horváth, 1913: 427; Ashton, 1914a: 351; Schulze, Kükenthal and Heider, 1926–40: 909; Kato, 1932: 184, 185; Imhof, 1933: 306; Neave, 1939a: 955; Kato, 1956: 70; Burns, 1957: 644; Metcalf, 1963: 260; Duffels and van der Laan, 1985: 250; Moulds, 1990: 196; de Boer, 1992b: 18, 19; de Boer, 1993a: 16, 17; de Boer, 1993b: 141, 142; de Boer, 1995a: 8; de Boer, 1995b: 203, 204, 206, 207, 215, 218, 219; de Boer, 1995c: 2, 3; de Boer, 1995d: 218, 219, 222, 224, 225, 233, 234; de Boer, 1996: 350, 351, 352, 353, 354, 355; de Boer and Duffels, 1996a: 155, 168, 170, 171; de Boer and Duffels, 1996b: 301, 304, 314; de Boer, 1997: 91, 92, 93, 112, 113, 114, 119; Moulds 2005a: 390, 392, 413, 430, 435.





**FIGURE 133.** Genus *Cyclochila* Amyot and Serville: (a) *C. australasiae* (Donovan), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorso-lateral view; (e) the same, underside of male body showing opercula; (f) the same, fore wing; (g) the same, hind wing; (h) male reproductive system, dissection with aedeagus removed from pygofer; (i) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (j) generic distribution. *c* costal vein, *R+Sc* radius plus subcostal veins.

**Type species:** *Cystopsaltria immaculata* Goding and Froggatt, 1904, by original designation.

**Included species:** AUSTRALIAN: *immaculata* Goding and Froggatt, 1904. OTHERS: none.

**Distribution** (Fig. 134g): North-eastern Queensland at Iron Range and from near Cooktown to Paluma (Moulds 1990).

**Diagnosis.** *Head* including eyes narrow, considerably less than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome narrower than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 134e) maculated, tegmen-like, green, yellow or blue; with multiple reticulation on outer half, bearing numerous cross veins; the majority of marginal cells are long and slender, being at least three times longer than wide; basal cell broad and elongate; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; median vein with an additional anterior branch from very near or at the basal cell; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; veins CuP and 1A fused in part; infuscation absent; wing outer margin greatly reduced and mostly contiguous with ambient vein. *Hind wings* (Fig. 134f) usually with at least 10 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A almost straight, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine lying flat. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, inner margin curved, clearly not meeting. *Male abdomen* markedly inflated, substantially hollow, obtuse; tergites in cross-section with sides concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs many, regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 134a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, near diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

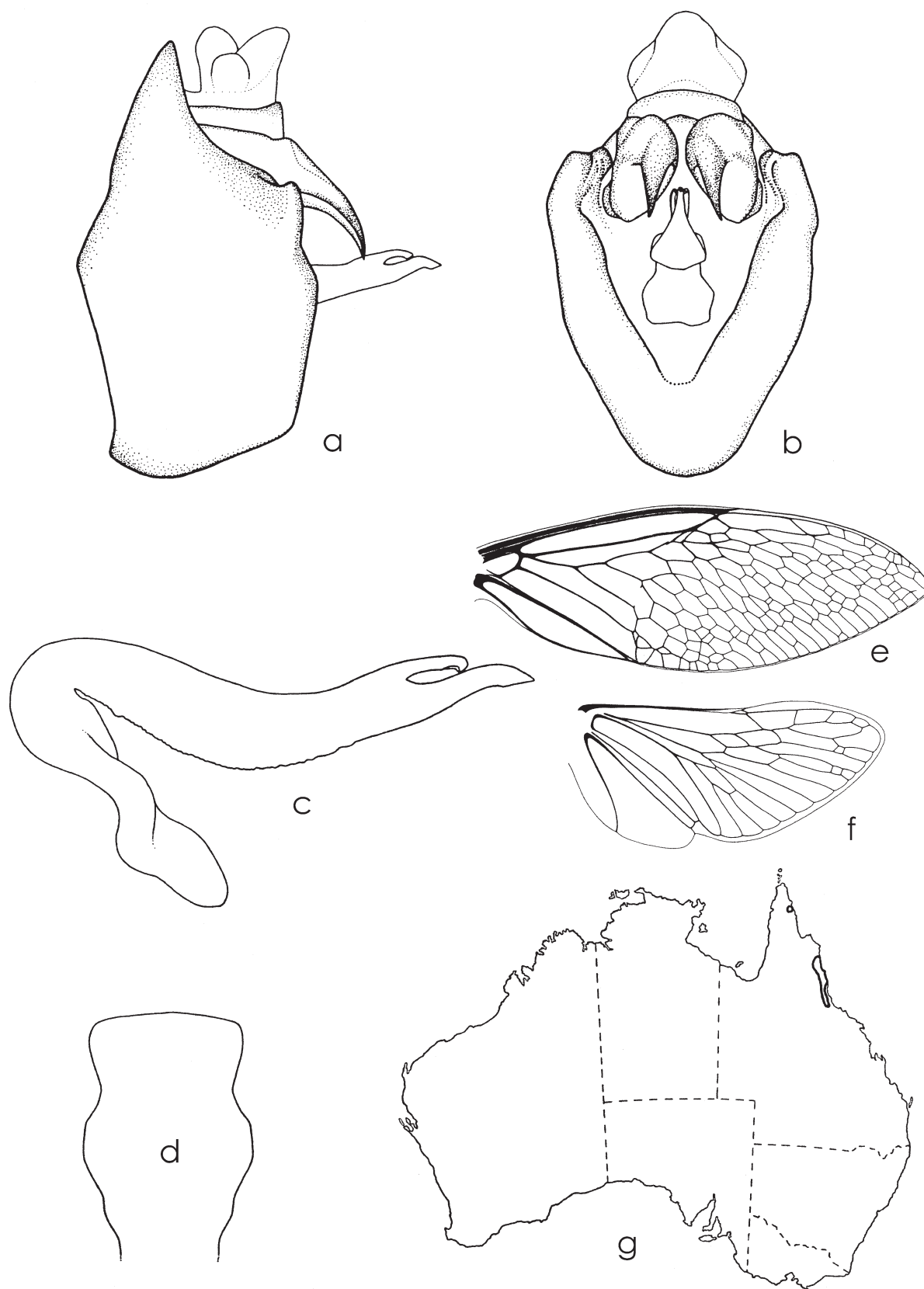
**Distinguishing characters.** Medium to large cicadas. A very distinctive genus, similar in appearance only to *Cystosoma*. Body and fore wings usually green or rarely orange-yellow or turquoise. Fore wings leaf-like, opaque, with the majority of marginal cells long and slender, being at least 3x longer than wide. Hind wing venation shows considerable abnormalities but usually there are 10 apical cells. Unlike *Cystosoma*, the fore wing median vein has a supernumerary branch arising at or close to the basal cell. The male abdomen is markedly inflated. The male genitalia are unique in having an aedeagus bearing a pair of dorsal subapical appendages that are usually knobbed.

**Discussion.** De Boer (1995b) defined this genus and discussed its phylogenetic relationships to other Cicadidae. Phylogenetic relationships are also documented by Moulds (2005a). Moulds (1990) summarises the known distribution and biology of the single species included in this genus.

### Genus *CYSTOSOMA* Westwood

*Cicada* (*Cystosoma*) Westwood, 1842b: 118.

*Cystosoma* Agassiz, Erichson and Germar, 1842: 7; Amyot and Serville, 1843: 460; Westwood 1843: 33; Blanchard, 1846: 565; Agassiz, 1848: 332; Blanchard, 1848a: 82; Walker, 1850: 254; Walker, 1858a: 1; Desmarest, 1859: 203; Dohrn, 1859: 71; Gerstaecker, 1863: 299; Stål, 1863a: 574; Stål, 1866a: 3; Claus, 1876: 666; Claus, 1880: 751; Distant, 1882: 125, 133; Claus, 1884: 894; Ludwig, 1886: 463; Hansen, 1890: 56, 67; Karsch, 1890a: 85; Karsch, 1890b: 191; Distant, 1892: 145; Hansen, 1902: 215; Hansen, 1903: 43; Kirkaldy, 1903a: 215; Goding and Froggatt, 1904: 566, 595, 662; Distant, 1905g:



**FIGURE 134.** Genus *Cystopsaltria* Goding and Froggatt: (a) *C. immaculata* Goding and Froggatt, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution.

276, 279; Distant, 1906d: 182, 185; Froggatt, 1907: 354; Kirkaldy, 1907b: 309; Horváth, 1913: 427, 430, 431; Ashton, 1914a: 357; Delétang, 1923: 610, 623; Handlirsch, 1925: 1116; Schulze, Kükenthal and Heider, 1926–40: 909; Tillyard, 1926: 161; Myers, 1928b: 392, 403; Imhof, 1929: 794; Myers, 1929b: 50, 82, 134, 207; Kato, 1932: 30, 33, 189; Imhof, 1933: 307; Neave, 1939a: 955; Cooper, 1941: 295; Metcalf, 1944: 155; Kato, 1956: 23, 26, 28, 70, 84; Burns, 1957: 670; Heslop-Harrison, 1957: 52; Metcalf, 1963: 433; Young, 1973: 378; Boulard, 1974: 740; Fleming, 1975a: 53; Popov, 1975a: 34; Popov, 1975b: 288; Boulard, 1979a: 46; de Jong, 1982: 182; Duffels and van der Laan, 1985: 315; Moulds, 1990: 192; de Boer, 1990: 64; de Boer, 1991: 2; de Boer, 1992a: 164; de Boer, 1992b: 18, 19, 21, 22; de Boer, 1993a: 16, 17; de Boer, 1993b: 141, 142; de Boer, 1995a: 8, 12, 16; de Boer, 1995b: 203, 204, 206, 207, 215, 218, 219; de Boer, 1995c: 2, 3; de Boer, 1995d: 218, 219, 222, 224, 225, 233, 234; de Boer, 1996: 350, 351, 352, 353, 354, 355; de Boer and Duffels, 1996a: 155, 168, 170, 171; de Boer and Duffels, 1996b: 301, 304; de Boer, 1997: 91, 92, 93, 112, 113, 114, 119, 121; Moulds, 2005a: 322, 390, 412, 413, 415, 422, 430, 435.

*Cystisoma* [sic]; Guérin-Méneville, 1844: 355 (misspelling).

*Cyrtosoma* [sic]; Spinola 1850: 50; Kirby, 1896: 458 (misspelling).

**Type species:** *Cicada* (*Cystosoma*) *saundersii* Westwood, 1842, by monotypy.

**Included species:** AUSTRALIAN: *saundersii* Westwood, 1842, *schmeltzi*, Distant, 1882. OTHERS: none.

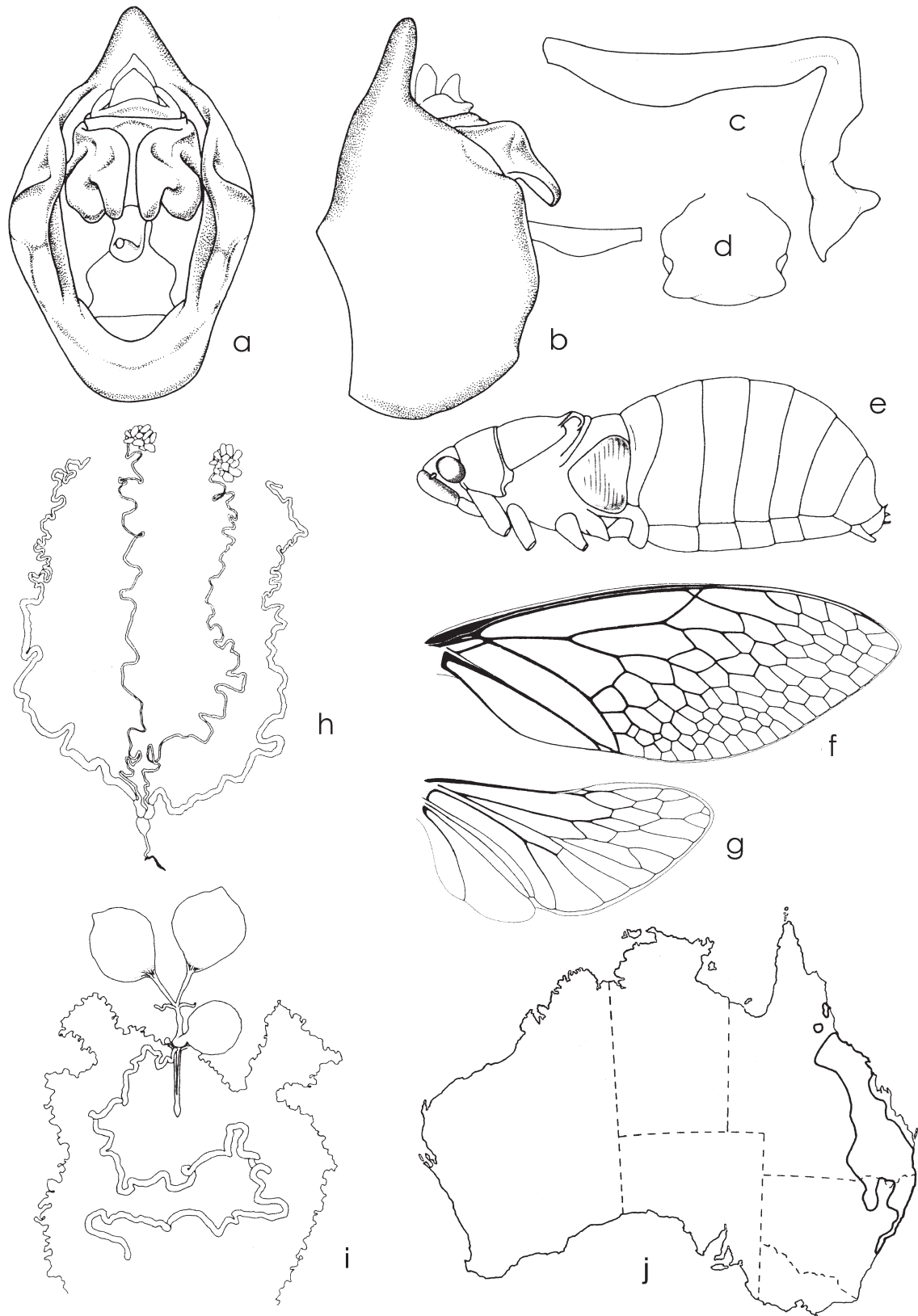
**Distribution** (Fig. 135j): Eastern Queensland and NSW from the Cairns region to Gosford and introduced to Sydney and Lord Howe Island (Moulds 1990, Moulds and Hangay 1998).

**Diagnosis.** *Head* including eyes narrow, considerably less than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax* (Fig. 135e): pronotal collar width at dorsal midline much less than diameter of eyes; paracosta confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome narrower than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 135f) maculated, tegmen-like, green, yellow or blue; with multiple reticulation on outer half, bearing numerous cross veins; only a few marginal cells reach three times longer than wide, the majority much less; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting at basal cell but veins not aligned together; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; veins CuP and 1A fused in part; infuscation absent; wing outer margin greatly reduced and in part contiguous with ambient vein. *Hind wings* (Fig. 135g) usually with 7 apical cells but abnormalities are common; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A weakly curved throughout its length, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine lying flat. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, inner margin nearly straight, clearly not meeting. *Male abdomen* (Fig. 135e) markedly inflated, substantially hollow, obtuse; tergites in cross-section with sides concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs many, regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 135a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 135h) with accessory glands long.

*Female reproductive system* (Fig. 135i) ditrysian; accessory glands of common oviduct short, no longer than common oviduct.

**Distinguishing characters.** Medium to large cicadas, usually green or rarely orange-yellow or turquoise. A very distinctive genus, similar in appearance only to *Cystopsaltria*. Fore wings leaf-like, opaque, with reticulate venation on outer half and bearing numerous cross veins; only a few marginal cells reach 3x longer than wide, the majority much less. Hind wing venation shows considerable abnormalities but usually there are 7 apical cells. The male abdomen is markedly inflated. Distinguished from *Cystopsaltria* by its much shorter fore wing marginal cells;



**FIGURE 135.** Genus *Cystosoma* Westwood: (a) *C. saundersii* Westwood, male genitalia, ventral view; (b) the same, male genitalia, lateral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, male head and body, lateral view; (f) the same, fore wing; (g) the same, hind wing; (h) the same, male reproductive system, dissection with aedeagus removed from pygofer; (i) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (j) generic distribution.



those of *Cystopsaltria* are mostly 3x longer than wide. Further, unlike *Cystopsaltria* the fore wing median vein lacks a supernumerary branch arising at or close to the basal cell.

**Discussion.** De Boer (1995b) defined this genus and discussed its phylogenetic relationships to other Cicadidae. Phylogenetic relationships are also documented by Moulds (2005a). Moulds (1990) summarises the known distribution and biology of *Cystosoma* species and the extensive literature concerning *C. saundersii*. Further notes and song analyses and biology are provided by Coombs (1996), Ewart (1995, 2001b) and Young (1972, 1973). Discussion and analyses of acoustic mechanisms in *C. saundersii* are provided by Bennet-Clark (1999) and Bennet-Clark & Young (1998).

## Genus *DICEROPYGA* Stål

*Cosmopsaltria* (*Diceropyga*) Stål, 1870b: 708; Atkinson, 1886: 166; Distant, 1889: 43.

*Cosmopsaltria* (*Diceropygia*) [sic]; Atkinson, 1884: 226 (misspelling).

*Diceropyga* Distant, 1905a: 60, 67 (stat. nov.); Distant, 1906d: 48, 62; Oshanin, 1908: 388; Distant, 1912a: 38, 49; Oshanin, 1912: 95; Ashton, 1914a: 348; Distant, 1914d: 387; Distant, 1914b: 346; Matsumura, 1917: 198; Ashton, 1921: 104; Handlirsch, 1925: 1117; Kato, 1925a: 100; Kato, 1925b: 21; Kato, 1925c: 68, 70; Singh-Pruthi, 1925: 191; Schmidt, 1926: 219, 257; Schulze, Kükenthal and Heider, 1926–40: 978; Kato, 1927: 29; Schmidt, 1928: 108; Kato, 1931: 39, 40, 47, 60; Kato, 1932: 164, 166, 202, 217, 324, 333; Neave, 1939b: 69; Jacobi, 1941: 317; Kato, 1941: 55; Kato, 1944: 6; Esaki, 1947: 31; Kato, 1954: 43; Kato, 1956: 67, 76, 78, 79; Burns, 1957: 629; Metcalf, 1963: 633; Duffels, 1965: 371, 372; Overmeer and Duffels, 1967: 30, 31; Duffels, 1968: 79; Duffels, 1970: 9; Naruse and Nakane, 1971: 61, 62; Dugdale, 1972: 857; Hayashi, 1975: 282; Esaki and Miyamoto, 1975: 635, 637, 638, 651; Duffels, 1977: 1–227; Boulard, 1979b: 49; Duffels, 1979: 19–20; Holloway, 1979: 234–236; Duffels, 1982: 156, 159, 160; Duffels, 1983a: 2, 3, 10, 11, 19, 20, 40, 41, 42; Duffels, 1983b: 491–498; Duffels, 1985: 278, 279; Duffels and van der Laan, 1985: 60; Duffels, 1986: 320, 321, 322, 323, 325, 330, 331; Duffels, 1988b: 8; Moulds, 1990: 102; Duffels, 1990: 65; Duffels and de Boer, 1990: 260, 261, 262, 263, 265, 266; de Boer, 1992a: 168; de Boer, 1992b: 24, 25; de Boer, 1993b: 144, 145; Duffels, 1993: 1227, 1230, 1232; de Boer, 1994b: 90; de Boer, 1995d: 172, 173, 206, 207, 208, 217, 218, 219, 222, 223, 225, 226, 228, 229, 230, 231, 233, 234, 235, 236, 237; de Boer and Duffels, 1996a: 155, 165, 166, 169, 171, 172, 173; de Boer and Duffels, 1996b: 301, 304, 306, 307, 308, 313, 314, 315, 316, 318, 320; Duffels, 1997: 549, 551, 552; Moulds 2005a: 387–389, 391, 394, 400, 407, 412, 413, 423, 430, 432, 433.

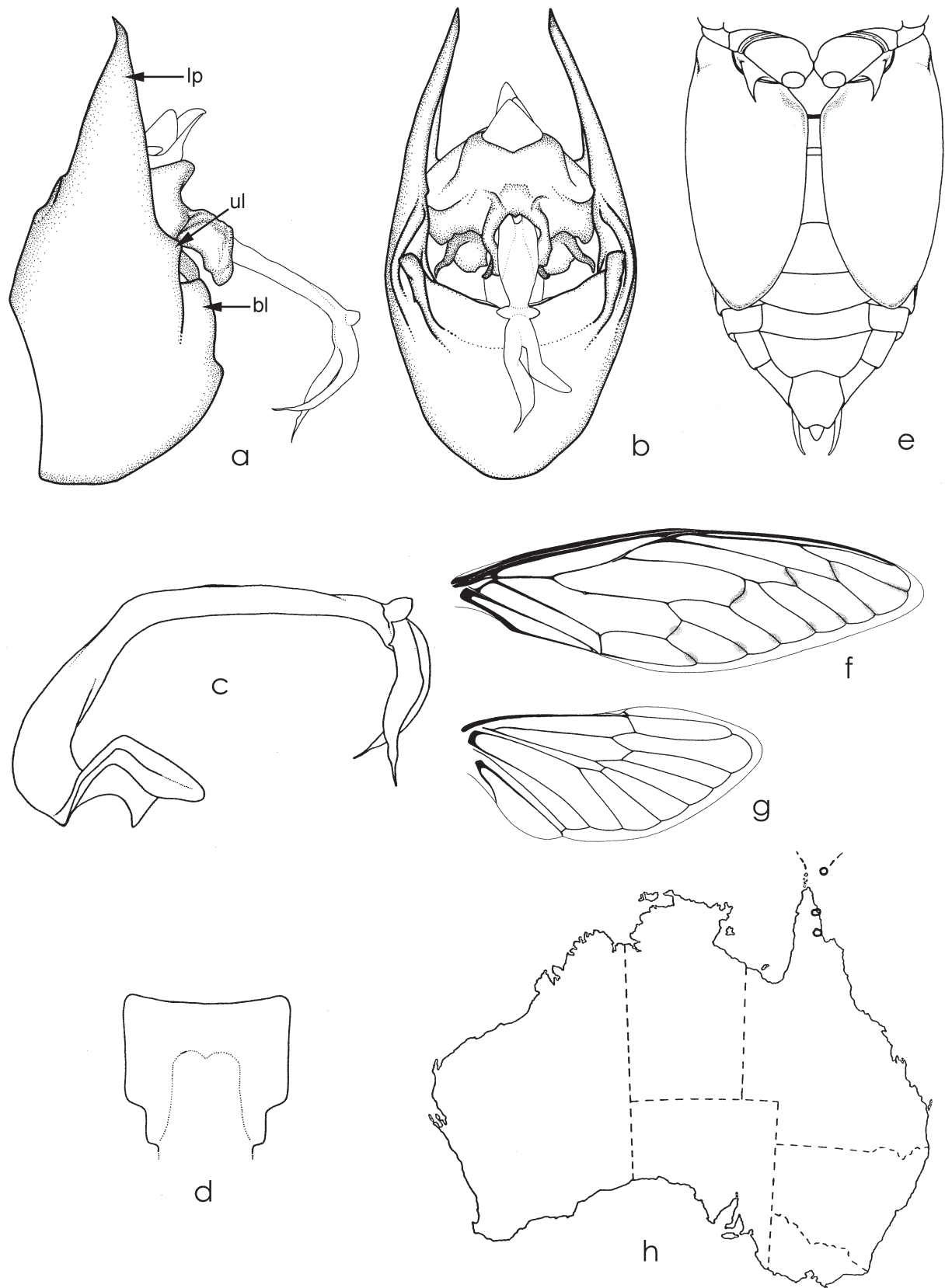
**Type species:** *Tettigonia oblecta* Fabricius, 1803, by subsequent designation by Distant, 1905a: 60, 67.

**Included species:** AUSTRALIAN: *subapicalis* (Walker, 1868). OTHERS: *auriculata* Duffels, 1977; *aurita* Duffels, 1977; *bacanensis* Duffels, 1988b; *bicornis* Duffels, 1977; *bihamata* Duffels, 1977; *bougainvillensis* Duffels, 1977; *didyma* (Boisduval, 1835); *gravesteini* Duffels, 1977; *guadalcanalensis* Duffels, 1977; *junctivitta* (Walker, 1868); *major* Duffels, 1977; *malaitensis* Duffels, 1977; *noonadani* Duffels, 1977; *novaebritannicae* Duffels, 1977; *novaequinae* Distant, 1912a; *obliterans* Duffels, 1977; *oblecta* (Fabricius, 1803); *ochrothorax* Duffels, 1977; *rennellensis* Duffels, 1977; *subjuga* Duffels, 1977; *tortifer* Duffels, 1977; *triangulata* Duffels, 1977; *woodlarkensis* Duffels, 1977.

**Distribution** (Fig. 136h): Maluku, mainland New Guinea, Bismarck Archipelago, Solomon Islands and far north-eastern Australia (Duffels 1983a, 1983b, Duffels and de Boer 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'; transverse ridges on underside of postclypeus ending laterally in a file of 1–4 transverse, short, irregularly knobby ridges. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota marginally ampliate, mid lateral tooth present; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 136f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2, 3, 5 and 7, also at extremities of longitudinal veins near ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 136g) with 6 apical cells; no infuscation on ambient vein; width of 1st





**FIGURE 136.** Genus *Diceropyga* Stål: (a) *D. subapicalis* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, underside of male body showing opercula; (f) the same, fore wings; (g) the same, hind wing; (h) generic distribution in Australia. *bl* basal lobe, *lp* lateral process, *up* upper lobe.

cubital cell at distal end about equal to 2nd cubital cell; anal lobe narrow with vein 3A straight or nearly so, short, adjacent to wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 136e) reaching far beyond tympanal cavity to cover some two thirds length of abdomen, clearly separated. *Male abdomen* (Fig. 136e) in cross-section with sides of tergites straight or weakly convex with distinct bend at lower third to the vertical, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 enlarged, accounting for approximately half abdominal length; male sternites III–VII in cross-section convex. *Timbal* covers present, flat, fully rounded dorsally and extending to metathorax but not tightly closed, lower margin extending vertically from auditory capsule before turning anteriorly; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 136a–d). Pygofer with distal shoulders distally extended into pointed, and often apically up-turned, lobe (lateral process of Duffels 1977); upper lobes present; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present but as a flap on 'hinge' tissue. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant; accessory spines (claspers) present. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apically nearly square, deep depression on midline not reaching apex; basal portion of basal plate directed forwards away from thecal shaft; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex partly or entirely fleshy, as two long pointed appendages; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Medium-sized cicadas. Distinguished from other Australian genera by having the transverse ridges on the underside of the postclypeus ending laterally in a file of 1–4 ridges. Further, the tooth on the lateral margin of the pronotal collar, in conjunction with a long narrow fore wing and a very narrow anal lobe to the hind wing, also separates *Diceropyga* from all other Australian genera. Males have very long opercula, those of the single Australian species reaching sternite 7, considerably longer than for any other Australian genus.

The lateral processes on the male pygofer (a development of the distal shoulder) are long and sharply pointed and reach beyond, sometimes far beyond, the anal styles and are characteristic of *Diceropyga*. The accessory spines (claspers) on the uncus are found in no other Australian genus.

**Discussion.** Duffels (1977) has revised the genus and discussed relationships with allied genera. The biogeography of the genus is discussed by Duffels (1977), Duffels and de Boer (1990), Duffels (1988a, 1988b), de Boer (1995d), de Boer and Duffels (1996a, 1996b). Phylogenetic relationships are also documented by Moulds (2005a). The distribution and biology of the single Australian species in this genus has been summarised by Moulds (1990) and Duffels (1977).

### Genus *DIEMENIANA* Distant

*Diemenia* Distant, 1905f: 204, 206 (nec *Diemenia* Spinola, 1850); Schulze, Kükenthal and Heider, 1926–40: 995; Neave, 1939b: 85.

*Diemeniana* Distant, 1906d: 140, 145 (replacement name for *Diemenia* Distant, 1905); Ashton, 1912b: 24; Hardy, 1918: 70; Delétang, 1923: 627; Tillyard, 1926: 161; Schulze, Kükenthal and Heider, 1926–40: 995; Kato, 1932: 177, 178; Neave, 1939b: 85; Kato, 1956: 69; Burns, 1957: 640; Burns, 1958: 145–161; Dugdale and Fleming, 1969: 937; Dugdale, 1972: 861, 877, 878; Duffels and van der Laan, 1985: 226; Moulds, 1990: 112; Daley, 2007: 79; Moulds, 2005a: 377, 392, 423, 424, 430, 436.

**Type species:** *Cicada coleoptrata* Walker, 1850 [= *Diemeniana frenchi* (Distant, 1907)], by original designation.

**Included species:** AUSTRALIAN: *cincta* (Fabricius, 1803), **comb. n.**; *euronotiana* (Kirkaldy, 1909); *frenchi* (Distant, 1907); *hirsuta* (Goding and Froggatt, 1904); *neboissi* Burns, 1958. OTHERS: none.

**Distribution** (Fig. 137h): The mountains and South Coast of NSW south from the Gibraltar Range, the Brindabella Range and elsewhere in the ACT, through the eastern third of Victoria and Tasmania (Moulds 1990, Moss and Popple 2000), and in the south east of South Australia from Guichen Bay, Mt Burr Range and Dismal Swamp (Haywood 2006a).

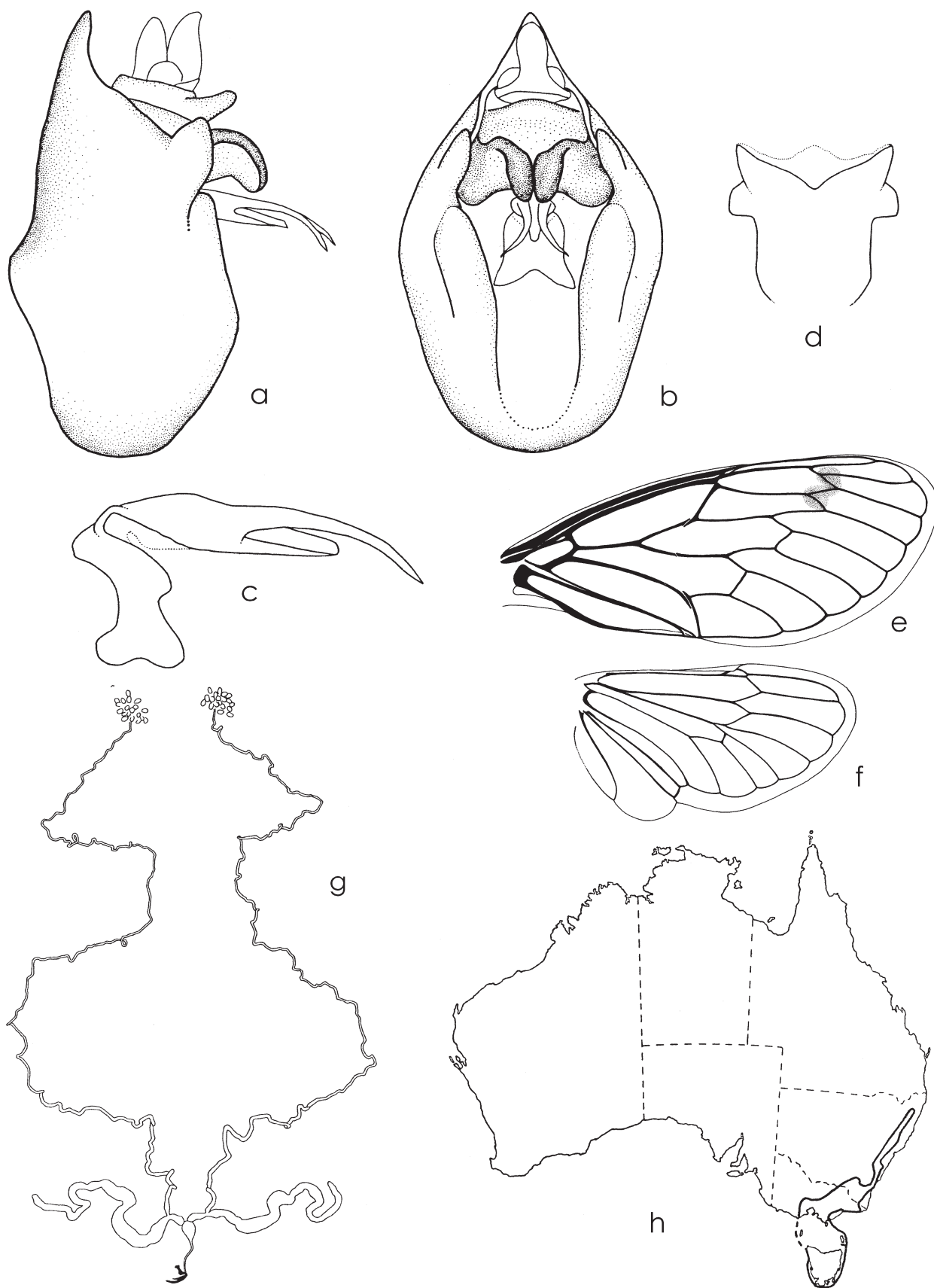
**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, mid lateral tooth present; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Figs 137e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m much less than distance between r-m and m except in *euronotiana* and *frenchi*; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation overlaying veins at bases of apical cells 2 and 3, infuscations elsewhere lacking; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 137f) with 6 apical cells; weak infuscation usually present at distal end of vein 2A; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less confluent with distal margin of tympanal cavity, well developed towards abdominal midline with sharply rounded apex facing midline, clearly separated. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites III–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 137a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed; restraining aedeagus; large, dominant, lobe-like, essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present and of medium length (no more than about half the length of pseudoparameres); thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca.

*Male reproductive system* (Fig. 137g) with accessory glands short.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Small cicadas with blackish, stout bodies and broad wings (approximately 2.4x longer than wide). Distinguished from all other Australian genera by having the combination of fore wing veins M and CuA meeting the basal cell independently, a mid lateral tooth to the slightly ampliate paranotum, the fore wings broad with infuscations confined to the bases of apical cells 2 and 3 and an infuscation at the distal end of hind wing vein 2A.



**FIGURE 137.** Genus *Diemeniana* Distant: (a) *D. frenchi* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) male reproductive system, dissection with aedeagus removed from pygofer; (h) generic distribution.

Distinguished from the superficially similar genus *Adelia* in having the male opercula clearly separated (very close or meeting in *Adelia*). The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, thus differing from *Adelia* that has an endotheca that is clearly sclerotized.

**Discussion.** Phylogenetic relationships of this genus have been documented by Moulds (2005a) in a cladistic analysis and in the introductory section of this paper. The species of *Diemeniana* have been reviewed by Burns (1958) and Moulds (1990). Haywood (2006a) provides notes on the occurrence of the genus in South Australia. Further notes on the species in this genus are provided by Arensburger, *et al.* (2004a), Moss (1989), and Moss and Popple (2000).

## Review of selected species

### *Diemeniana cincta* (Fabricius), **comb. n.**

*Tettigonia cincta* Fabricius, 1803: 38.

*Cicada cincta* (Fabricius): Germar, 1830: 44.

*Tibicen cinctus* (Fabricius): Stål, 1870a: 7.

*Abricta* (?) *cincta* (Fabricius): Distant, 1906d: 131.

*Diemeniana tillyardi* Hardy, 1918: 69–70 **Syn. n.**

*Abricta cincta* (Fabricius): Duffels, 1977: 209.

Fabricius (1803) erroneously recorded *Tettigonia cincta* from Noua Cambria (= New Caledonia). The only known type (a syntype male in UZMC, ex University of Kiel collection, examined) is clearly the same species as Hardy's *Diemeniana tillyardi* (holotype male in AM, examined).

### *Diemeniana euronotiana* (Kirkaldy)

*Cicada aurata* Walker, 1850: 215.

*Tibicen* (?) *auratus* (Walker): Atkinson, 1886: 178–179.

*Tibicen auratus* (Walker): Distant, 1892: 153.

*Abricta aurata* (Walker): Distant, 1906d: 130.

*Abricta euronotiana* Kirkaldy, 1909: 391 (replacement name for *Cicada aurata* Walker, 1850).

*Diemeniana richesi* Distant, 1913a: 488. **Syn. n.**

The only known type of *D. richesi* (a syntype male in BMNH) is a specimen of *D. euronotiana* with stained wings. A male and female of this species taken at Cooma and now in ANIC, ex WW Froggatt collection are possibly part of the original series; these specimens are also partly stained but not as much as the syntype male.

## Genus *DIPSOPSALTA* gen. n.

**Type species:** *Pauropsalta signata* Distant, 1914 (Pl. 2, fig. 15).

**Included species:** AUSTRALIAN: *signata* (Distant, 1914), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *dipsa* meaning dry, thirsty, and referring to the semi arid habitat of the type species, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 138f). Known only from Cue, Western Australia.

**Diagnosis.** *Head* including eyes about as wide or narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth. Cruciform elevation wider than long. Epimeral lobe not reaching operculum. Metanotum



partly visible at dorsal midline. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells shorter than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* usually with 5 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about twice that of 2nd cubital cell; anal lobe narrow with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 138e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 138e) bulbous, broadest at about segment 2; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, unusually swollen so that each is partly visible in lateral profile. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 138a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, small to moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view short and broad, apically broadened with 'ears' and far broader than long; basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate, junction between theca and basal plate without a functional 'hinge'; thecal shaft nearly straight, parallel-sided, thick-set; pseudoparameres present, arising subapically, lateral of theca, fused for half their length or more, in dorsal view wide apart, diverging, in lateral view aligned with the thecal shaft with their distal portion turned down; endotheca concealed; endothecal ventral support absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female abdominal segment 9* abbreviated and wider than long; dorsal beak with a developed apical spine or pointed apex (visible in dorsal view); ovipositor sheath not extended beyond apex of abdominal segment 9. *Female reproductive system* unknown.

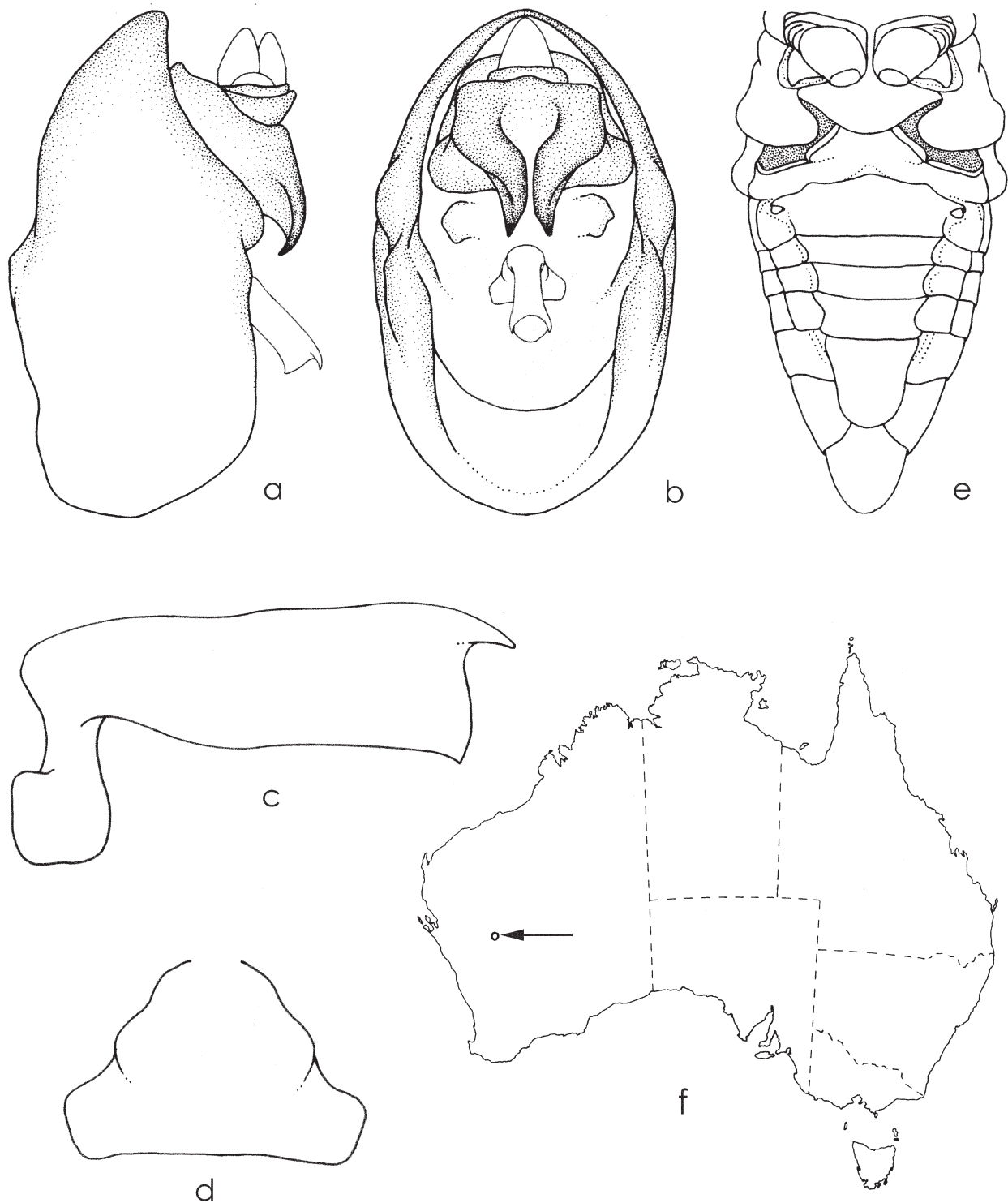
**Distinguishing characters.** Small cicadas. Differs from all other Australian genera in having the combination of fore wing veins M and CuA completely fused as one, fore wing apical cells clearly shorter than the ulnar cells, a fore wing radial cell that is a little shorter than the distance from its apex to wing tip, and paranota that are confluent with adjoining pronotal sclerites and without a midlateral tooth. The abdomens of both sexes tend to be rather cylindrical (Pl. 2, fig. 15, female).

The male genitalia have an aedeagus that is thick-set, nearly straight and parallel-sided, the pseudoparameres are very short, broad, arise subapically and extend distal of the gonopore, and the endotheca is concealed.

*Dipsopsalta* is superficially similar to *Pipilopsalta*, *Uradolichos* and *Mugadina* because of the swollen male abdomen; it is distinguished from all three by the very short apical cells of the fore wing.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.





**FIGURE 138.** Genus *Dipsopsalta* **gen. n.**: (a) *D. signata* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, underside of male body showing opercula; (f) generic distribution.

## Review of selected species

### *Dipsopsalta signata* (Distant) comb. n.

*Pauropsalta signata* Distant, 1914c: 64.

*Pauropsalta lineola* Ashton, 1914a: 357. **Syn. n.**

*Melampsalta lineola* (Ashton): Burns, 1957: 656.

*Melampsalta signata* (Distant): Burns, 1957: 662.

The one known syntype male of *signata* in BMNH (examined) is clearly conspecific with the two syntype females of *lineola* in the SAM (examined). All three specimens were collected by H.W. Brown from Cue, Western Australia, and most likely collected together. Horace Brown was renowned for splitting his catches between Ashton and Distant, both of whom would then publish descriptions of any new species, inevitably creating synonymies. Further, there are two additional males in the SAM bearing identical data to that of the female syntypes but these may have reached Ashton after he published his description of the female.

Both Distant and Ashton published their descriptions in the same year. Investigations revealed that Distant's description was published in July and Ashton's in December, thus *signata* Distant takes priority.

### Genus *DRYMOPSALTA* Ewart

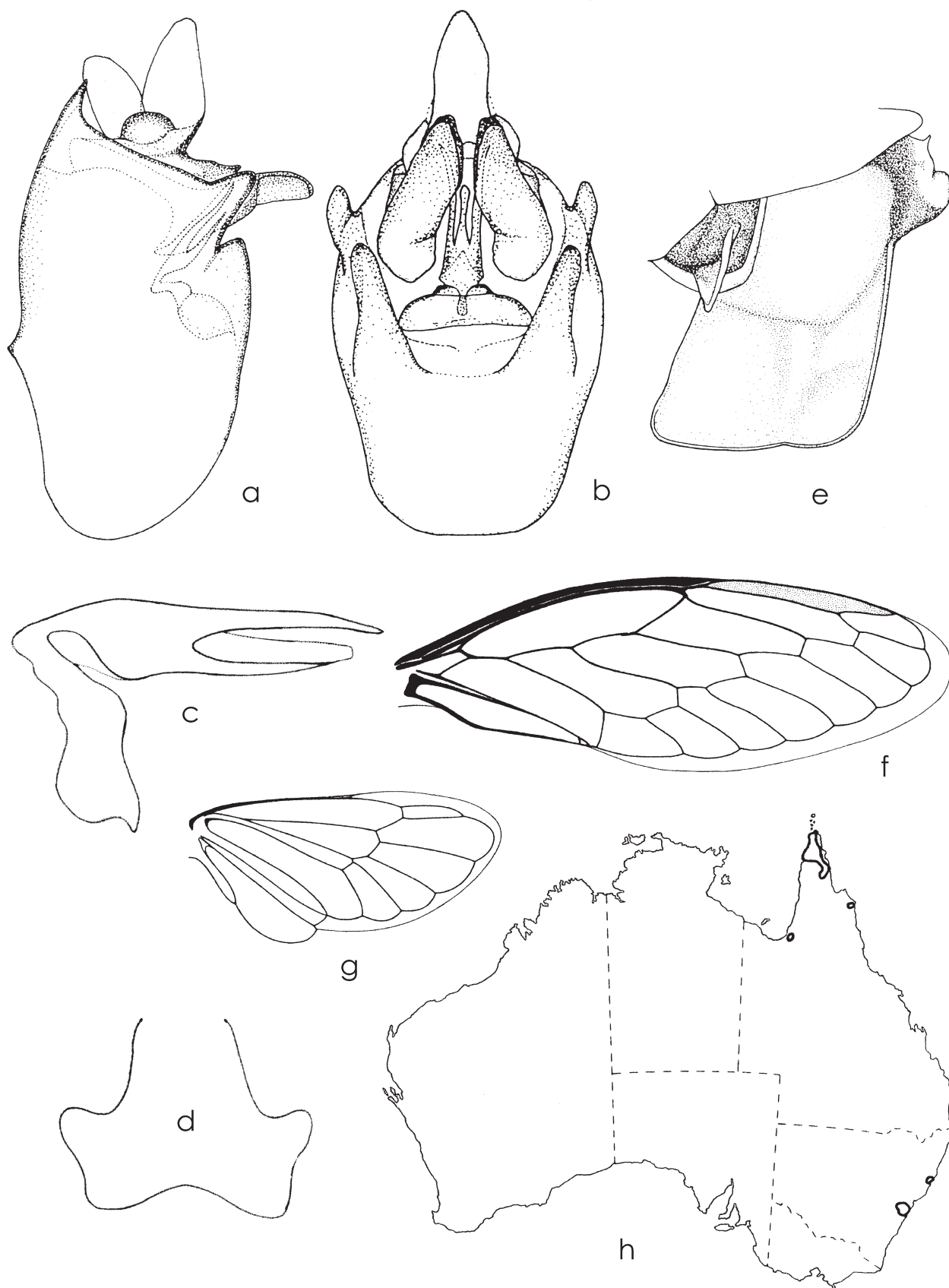
*Drymopsalta* Ewart, 2005a: 481–483.

**Type species:** *Drymopsalta crepitum* Ewart, 2005, by original designation (Pl. 2 fig. 1).

**Included species:** AUSTRALIAN: *crepitum*, Ewart, 2005; *daemeli* (Distant, 1905). OTHERS: none.

**Distribution** (Fig. 139h): North-eastern Queensland on Cape York Peninsula from Punsand Bay in the far north, south almost to Cooktown and Normanton, and in New South Wales from Harrington near Taree to Sydney and the Blue Mountains (Ewart, 2005a; Moulds, 1990).

**Diagnosis.** *Head* including eyes about as wide as or a little wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 139f) hyaline; with 8 apical cells; apical cell 1 of usual proportions (half the length or more of apical cell 2), but often very small (far less than half the length of apical cell 2) in *daemeli*; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa slightly broader a little before node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest, but sometimes nearly equal; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell usually shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wing* (Fig. 139g) with 5 or 6 apical cells (rarely 4); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 139e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, almost parallel-sided, distally angular, and not rounded towards abdominal midline, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and



**FIGURE 139.** Genus *Drymopsalta* Ewart: (a) *D. crepitum* Ewart, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, left male operculum; (f) the same, fore wing; (g) the same, hind wing; (h) generic distribution.

one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

**Male genitalia** (Figs 139a–d). Pygofer in ventral view very wide across upper lobes and thereafter tapered to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, essentially flat, narrow in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view) in *daemeli*, but in *crepitum* without a spine or apical point, completely straight or broadly curved across apical region; *Female reproductive system* unknown.

**Distinguishing characters.** Very small cicadas (Pl. 2, fig. 1). Distinguished from other Australian genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, paranota confluent with adjoining pronotal sclerites and male opercula that are almost parallel-sided, distally angular, and not rounded towards abdominal midline (Fig. 139e).

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, and a pygofer that is very wide across the upper lobes and thereafter tapers strongly to the base.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Ewart (2005a) provides details on the type species, *D. crepitum*, including an analysis of its song. Moulds (1990) provides details on *D. daemeli*, then *Urabunana daemeli*. Notes on seasonal occurrence and plant association of *D. daemeli* in western Sydney are provided by Emery and Emery (2002), Emery *et al.* (2005).

### Genus *EREMPSALTA* gen. n.

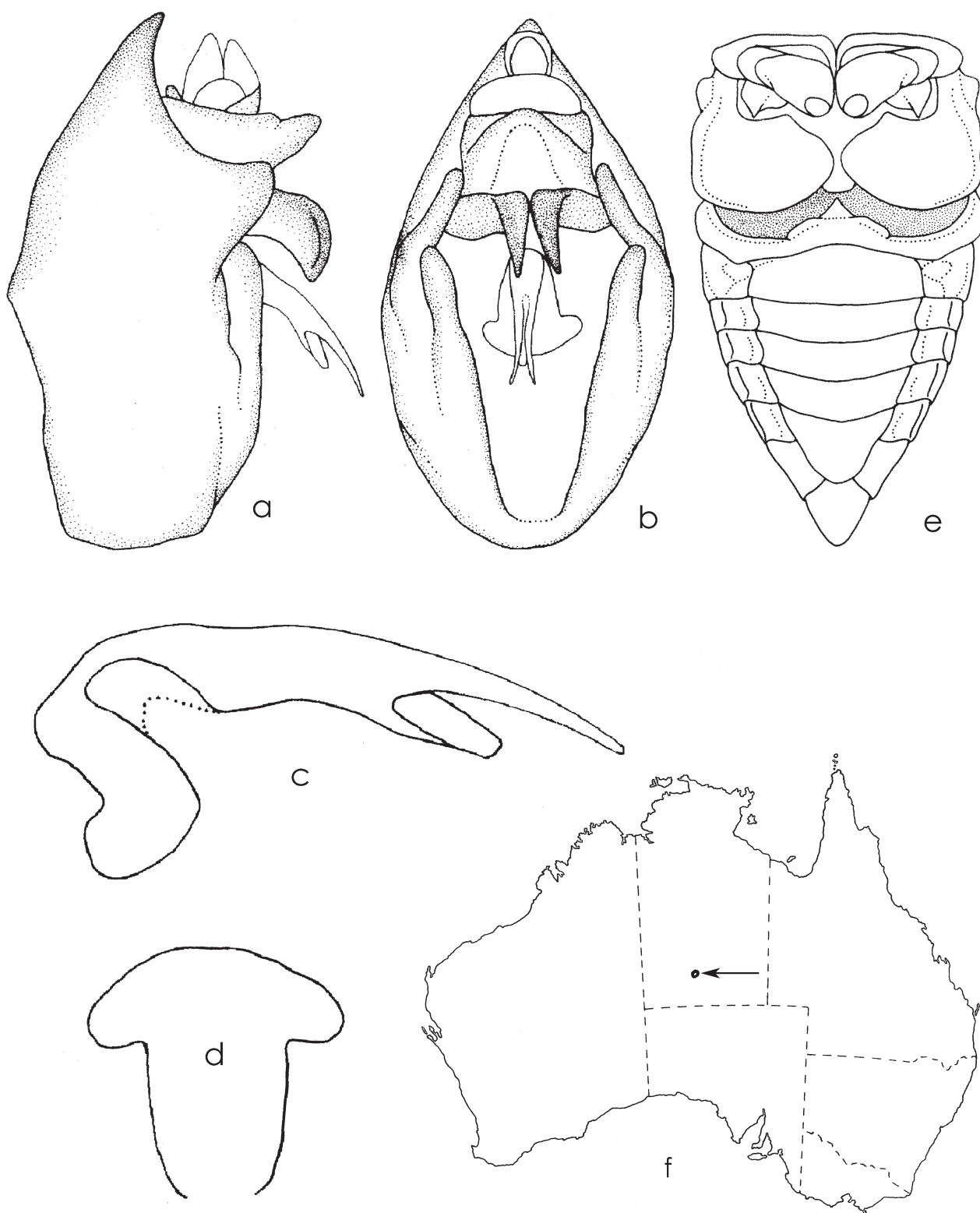
**Type species:** *Melampsalta hermannsburgensis* [sic.] Distant, 1907 (Pl. 1, fig. 6).

**Included species:** AUSTRALIAN: *hermannsburgensis* (Distant, 1907), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *eremia* meaning solitude, desert, wilderness, and referring to the arid and isolated locality from which the type species of this genus is recorded, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 140f): Known only from the type locality, Hermannsburg, Central Australia.

**Diagnosis.** *Head* including eyes clearly narrower than width of mesonotum between wings; eyes tending large, together occupying almost half the width of the head; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; apical cell very small; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly



**FIGURE 140.** Genus *Erempsalta* **gen. n.:** (a) *E. hermannsburgensis* (Distant), male genitalia, lateral view; (b) the same, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) underside of male body showing opercula; (f) generic distribution.



curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation either absent or confined to bases of apical cells 2 and 3; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect but tending semi-prostrate. *Male hind leg* meracanthus short. *Male opercula* (Fig. 140e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, not meeting. *Male abdomen* (Fig. 140e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 140a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of their length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from all other genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, paranota that are confluent with adjoining pronotal sclerites with no mid lateral tooth, and eyes that are large and which together make up about half the width of the head. The single described species in this genus is almost entirely green (Pl. 1 fig. 6).

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, and claspers that are claw-like with diverging distal ends.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.

## Note on spelling of type species

*Erempsalta hermannsburgensis* (Distant, 1907), comb. n.

*Melampsalta hermannsburgensis* Distant, 1907: 419.

*Melampsalta hermannsburgensis* Ashton, 1914: 354; Burns, 1957: 653.

*Cicadetta hermannsburgensis* Metcalf, 1963: (2) 317.

*Cicadetta hermannsburgensis* Moulds, 1990: 144.

Distant (1907) named this species after the type locality, Hermannsburg, but he appears to have not realised that the name is spelt with a double 'n'. It is obvious that Distant intended to name the species after the type locality because he uses the ending 'ensis' (a Latin suffix denoting a locality) and Hermannsburg is the only locality mentioned by Distant. Consequently, under Article 32.5.1 of the *International Code of Zoological Nomenclature* (fourth edition, 1999) the spelling should be corrected.

## Genus *EWARTIA* gen. n.

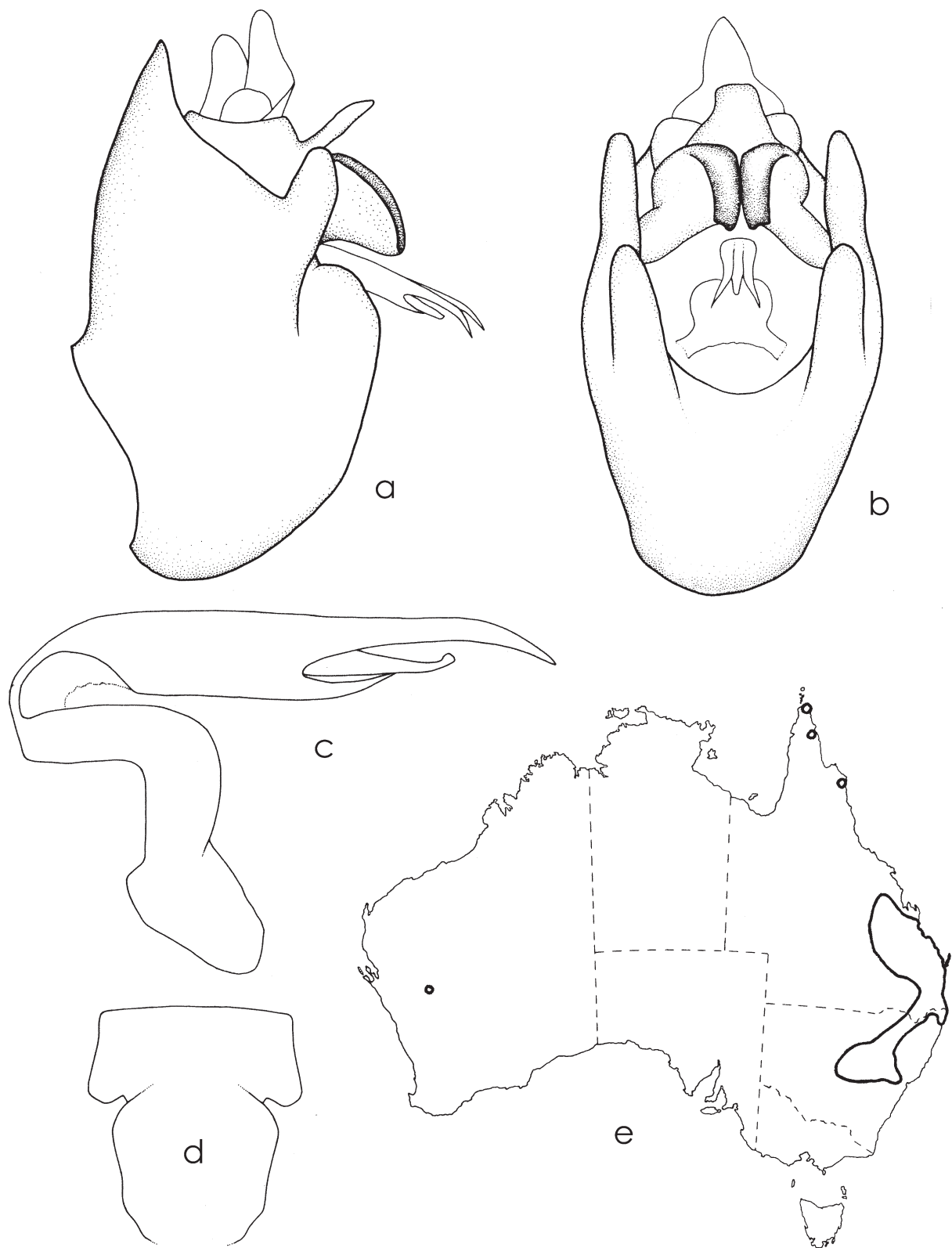
**Type species:** *Melampsalta oldfieldi* Distant, 1883.

**Included species:** AUSTRALIAN: *brevis* (Ashton, 1912), **comb. n.**; *cuensis* (Distant, 1913), **comb. n.**; *oldfieldi* (Distant, 1883), **comb. n.** OTHERS: none.

**Etymology.** Named in honour of Dr Tony Ewart in recognition of his considerable contribution to our knowledge of Australian cicadas.

**Distribution** (Fig. 141e): Northern Queensland from Cape York Peninsula south almost to Cooktown, south-eastern Queensland south from the Kerlong Range to north-eastern New South Wales inland as far as Lake Cargelligo and Broke, and from Cue in Western Australia (Ewart 1993, Moulds 1990).

**Diagnosis.** *Head* including eyes about as wide or wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells, rarely 5 in aberrant specimens and then usually only in one wing; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.



**FIGURE 141.** Genus *Ewartia* gen. n.: (a) *E. oldfieldi* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution.

*Male genitalia* (Figs 141a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal

lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of its length, with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from all other genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, no fore wing infuscations, the fore wing costa evenly rounded, the paranota confluent with adjoining pronotal sclerites and lacking a mid lateral tooth, and the posterior margin of the timbal cavity completely rounded.

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, the pseudoparameres are aligned with the thecal shaft for much of their length, while the claspers are essentially flat and wide in lateral view with an overhanging lip along the outer margin.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. The abbreviated abdomen of *E. brevis* is not considered significant in separating this species generically because there are other undescribed species belonging to *Ewartia* that have abdominal proportions intermediate between *brevis*, *oldfieldi* and *cuensis*. Notes on *E. oldfieldi*, including song analyses, are provided by Ewart (1988, 1995, 1998a) and Moulds (1990). Popple & Strange (2002) provide notes on habitat.

### Genus *FROGGATTOIDES* Distant

*Frogattoides* [sic] Distant, 1910: 417–18 (original misspelling); Schulze, Kükenthal and Heider, 1926–40: 1325; Neave, 1939b: 423.

*Larrakeeya* Ashton, 1912d: 77; Schulze, Kükenthal and Heider, 1926–40: 1769; Neave, 1939b: 870; Metcalf, 1944: 155.

*Frogattoides* Distant, 1913b: 601 (justified corrected spelling); Ashton, 1914a: 356; Burns, 1957: 666; Metcalf, 1963: 418; Dugdale, 1972: 877, 880; Duffels and van der Laan, 1985: 299, Moulds, 1990: 176; Moulds 2005a: 390, 414, 415, 430, 436.

*Frogattoides* [sic]; Heslop-Harrison, 1957: 52 (misspelling).

**Type species:** *Frogattoides typicus* Distant, 1910, by monotypy.

**Included species:** AUSTRALIAN: *pallidus* (Ashton, 1912); *typicus* Distant, 1910. OTHERS: none.

**Distribution** (Fig. 142i): Western half of Western Australia excluding the northern and southern parts of the region, and inland southern Queensland and the central part of northern NSW (Moulds 1990). The type locality for *F. typicus*, Stannary Hills in northern Queensland, is considered erroneous.

**Diagnosis.** *Head* (Fig. 142h) including eyes narrow, considerably less than mesonotum; supra-antennal plate meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; very pilose both above and below; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long, lateral areas domed; epimeral lobe not reaching operculum; metathoracic spiracles exceedingly large, opening closed by a thin translucent

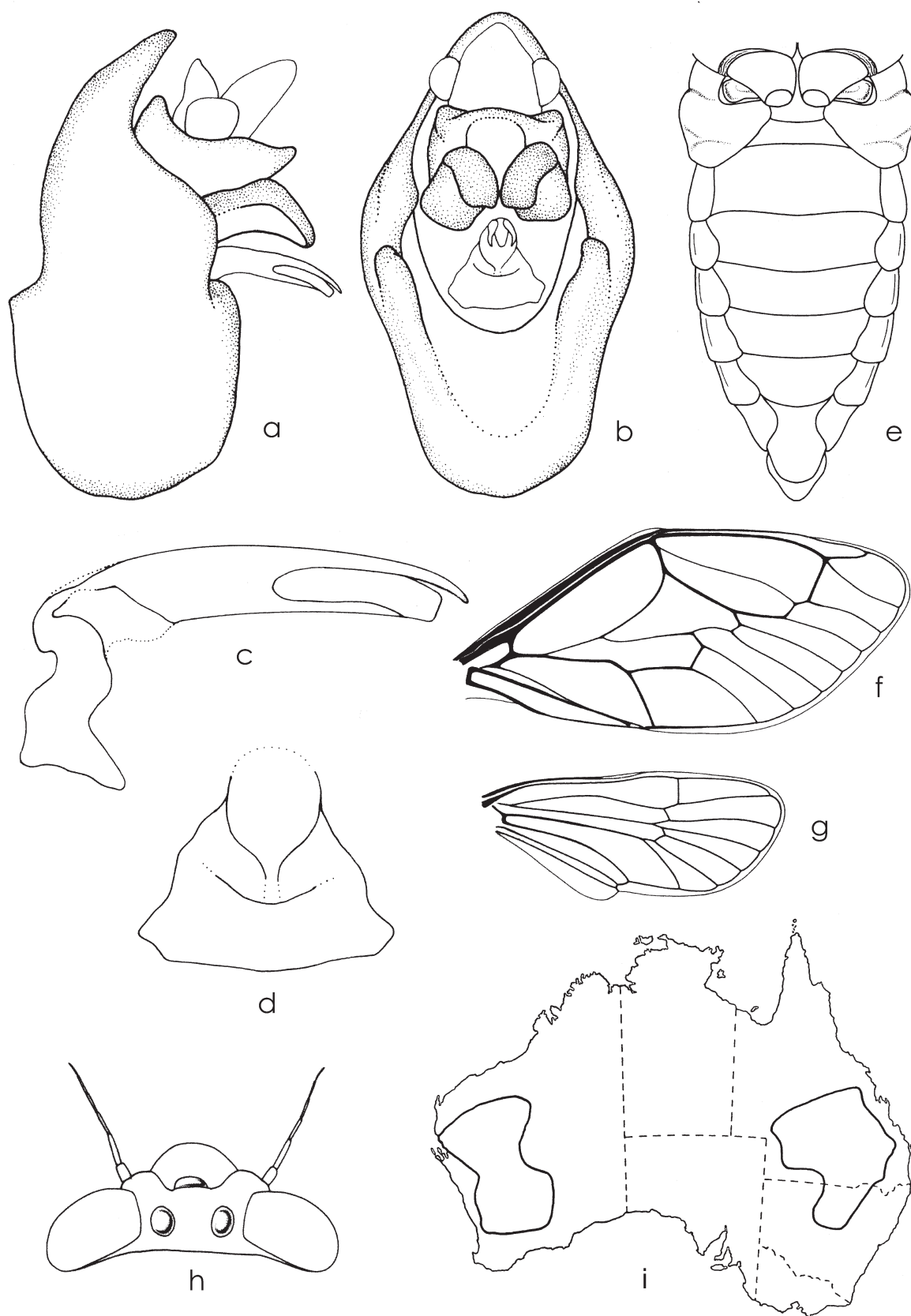
membrane and leading to a large thoracic cavity. Metanotum partly visible at dorsal midline. *Fore wings* (Fig. 142f) hyaline; with 8 or 9 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; anterior margin obtusely angled at node; costal vein (C) clearly higher than R+Sc, parallel-sided to node, gently and evenly curved in male; pterostigma present; vein CuA strongly bowed distally and cubital cell larger than medial cell; ulnar cell 3 exceedingly broad, its common margin with radial cell occupying about half its length; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 142g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe very narrow with vein 3A straight, very short, adjacent to wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect; tarsi short, about one third length of tibiae. *Male opercula* (Fig. 142e) more or less reaching distal margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, concave along lateral margin, not meeting, strongly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 142e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbal* covers absent; timbal ribs irregular in size, abutting; basal dome concealed by a very narrow compressed timbal cavity; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; auditory capsule very large, raised, hemispherical.

*Male genitalia* (Figs 142a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer not the widest point; pygofer with distal shoulders not developed; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, narrow in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short (about as long as broad), divided into two discs tilted to midline, bordered by anterior rim; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge', large, completely separating theca from basal plate, highly visible in lateral view, aedeagus with hinge entirely fleshy; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of its length and with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, long (about three quarters length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** A very distinctive genus of medium-sized to smallish cicadas, faded green in colour and with highly modified, bent fore wings. The angled fore wing anterior margin and exceedingly broad ulnar cell 3 (which has its common margin with the radial cell occupying half that cell's length) clearly characterise this genus. Further, the mesothoracic spiracular opening is exceedingly large, closed by a thin translucent membrane and leading to a large internal thoracic cavity, the auditory capsule is very large, raised and hemispherical, the lateral areas of the cruciform elevation are domed (rather than flat) and the tarsi are short, about one third the length of the tibiae (rather than about half). The hind wing anal lobe is also very narrow and the thorax both above and below is very pilose.





**FIGURE 142.** Genus *Froggattoides* Distant: (a) *F. typicus* Distant, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, underside of male body showing opercula; (f) the same, fore wing; (g) the same, hind wing; (h) the same, head dorsal view; (i) generic distribution.

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, except that the ventral support is very long (about three quarters the length of the pseudoparameres) and the basal hinge is developed to such an extent that it lacks a chitinized back.

**Discussion.** Phylogenetic relationships of this genus are documented by Moulds (2005a) in a cladistic analysis, and in the introductory section of this paper. The two described species of this genus, *F. pallidus* and *F. typicus*, are very similar in appearance but have one remarkable difference; *pallidus* has 9 fore wing apical cells while *typicus* has only 8. Such a difference normally would suggest generic separation but these two species are otherwise very similar and with many unique attributes not found in other genera. In view of this very close similarity at species level and very different appearance from other cicadas I considered them best retained together in *Froggattoides*.

Notes on the distribution and biology of the species are provided by Moulds (1990). Further notes and analyses of the song and nocturnal behaviour of *F. typicus* are provided by Ewart (1998a) and Ewart & Popple (2001, 2007).

### Genus *GAGATOPSALTA* Ewart

*Gagatopsalta* Ewart, 2005a: 460.

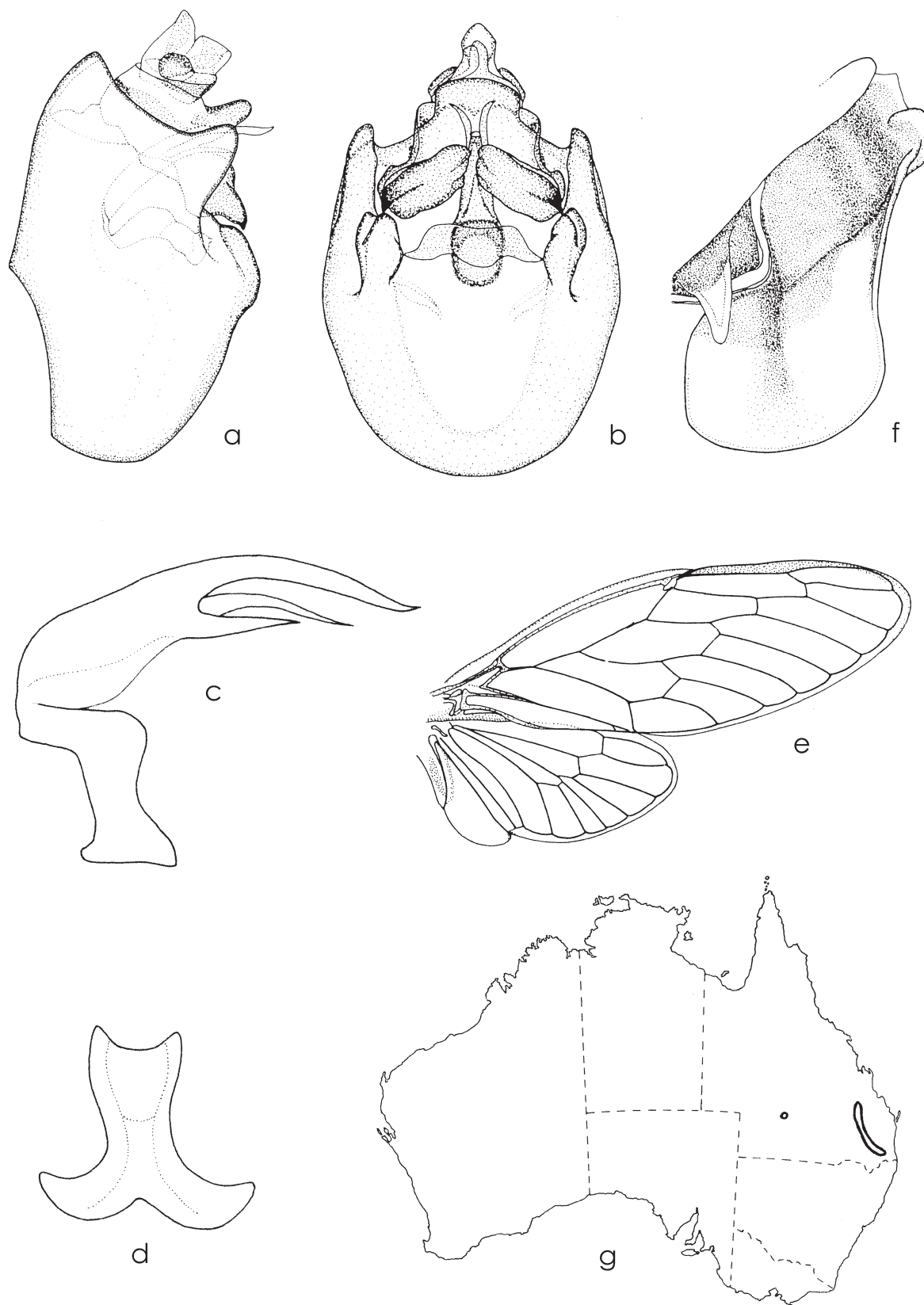
**Type species:** *Gagatopsalta auranti* Ewart, 2005, by original designation (Pl. 2, fig. 4).

**Included species:** AUSTRALIAN: *auranti* Ewart, 2005; *obscura* Ewart, 2005. OTHERS: none.

**Distribution** (Fig. 143g): Inland south-eastern Queensland, from near Quilpie and through the brigalow belt south from Isla Gorge (Ewart, 2005a).

**Diagnosis.** *Head* including eyes wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 143e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m (in most specimens); apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 143e) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 143f) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, not unusually swollen. *Timbal* covers absent; timbals with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases.

*Male genitalia* (Figs 143a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, in lateral view abutted against or partly tucked behind pygofer margin; pygofer basal lobe in lateral view with much of distal margin a little protruding, angled, its margin straight or slightly incurved; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large,



**FIGURE 143.** Genus *Gagatopsalta* Ewart: (a) *G. auranti* Ewart, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, fore and hind wings; (f) the same, left male operculum; (g) generic distribution.

dominant, claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices very widely separated, forming the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight or curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft but gently curved down throughout its length, with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from all other genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, the paranota confluent with adjoining pronotal sclerites and lacking a mid lateral tooth, male abdominal tergite 1 narrow along dorsal midline, and the posterior margin of the timbal cavity ridged on its lower half or so. The type species of the genus has conspicuous orange colouration on the thorax and wing bases (Pl. 2, fig. 4).

The male genitalia an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, while the claspers are claw-like and diverging towards their distal ends so that their apices form the widest dimensions of the claspers.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis included in the introductory part of this paper. Ewart (2005a) provides details on the two described species in this genus including analyses of their songs.

### Genus *GALANGA* gen. n.

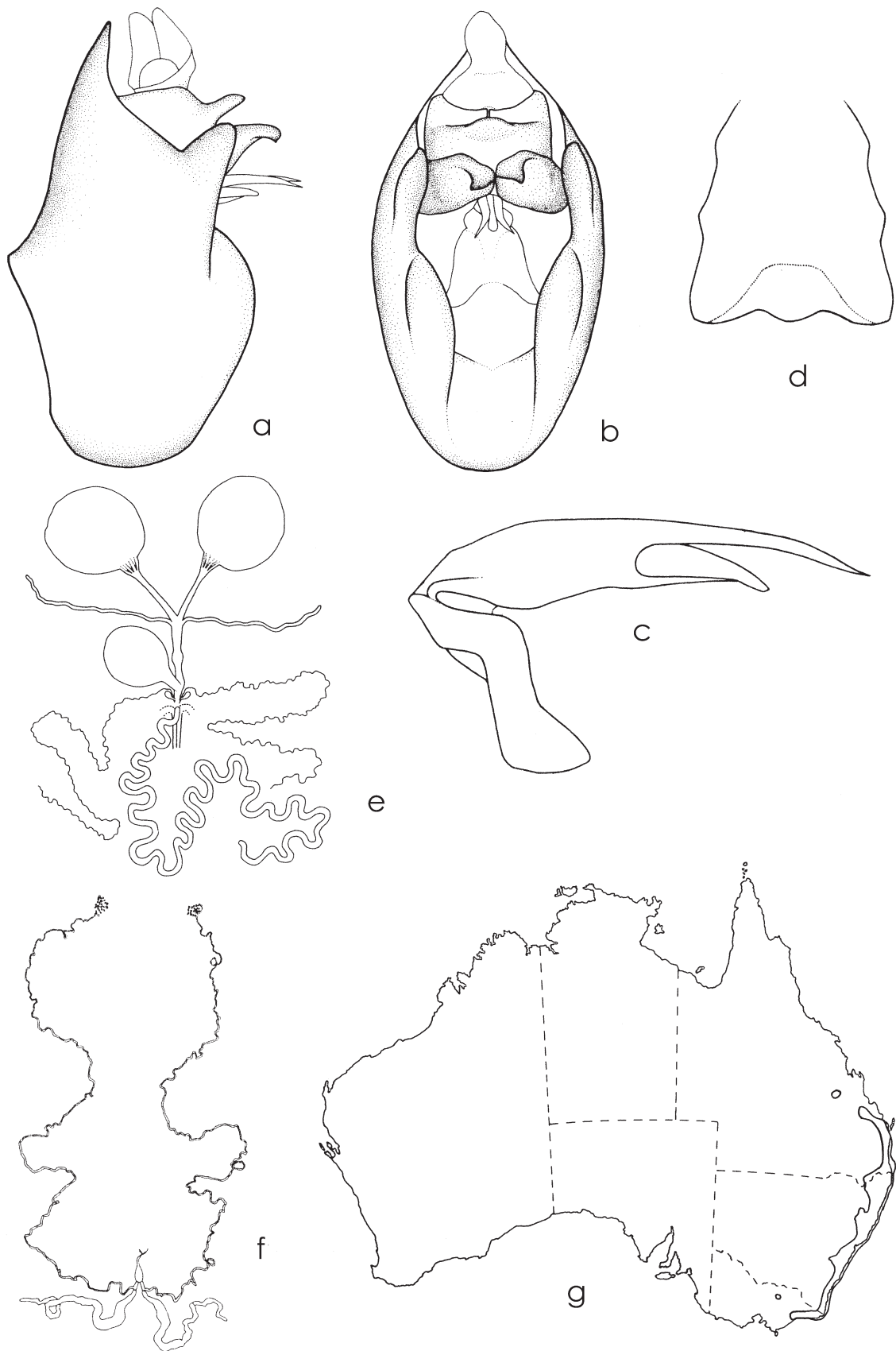
**Type species:** *Melampsalta labeculata* Distant, 1892.

**Included species:** AUSTRALIAN: *labeculata* (Distant, 1892), **comb. n.** OTHERS: none.

**Etymology.** Galanga was the aboriginal name for cicadas used by tribes living in the vicinity of what is now Sydney. Feminine.

**Distribution** (Fig. 144g): South-eastern Queensland south from the Blackdown Tableland, the eastern margin of New South Wales, the Australian Capital Territory (S. Robertson), and north-eastern Victoria as far west as Moyhu (Faithfull 2010) and the Mitchell River (Dunn 1991).

**Diagnosis.** *Head* including eyes about as wide as or wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax:* pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation confined to bases of apical cells 2 and 3; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal



**FIGURE 144.** Genus *Galanga* **gen. n.:** (a) *G. labeculata* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (f) the same, male reproductive system, dissection with aedeagus removed from pygofer; (g) generic distribution.



cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 144a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, tubular, tapering to a hooked beak-like distal end; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, pseudoparameres unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present; of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* (Fig. 144f) with accessory glands long.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* (Fig. 144e) ditrysian; accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Small cicadas. The fore wing veins M and CuA meet the basal cell with their stems completely fused as one; the fore wing cross veins r and r-m are much closer together than r-m and m; the fore wing infuscations are confined to the bases of apical cells 2 and 3, and the paranota are ampliate with a mid lateral tooth. These characters distinguish *Galanga* from all genera except *Gelidea* and some species of *Kobonga*, *Clinopsalta* and *Physeema*. *Galanga* is distinguished from these genera by the male genitalia which have claspers that are tubular, diverging, and tapering to hooked beak-like distal ends.

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution, habitat and biology of the single species included in this genus are provided by Moulds (1990). Further notes on this species are provided by Coombs (1993b, 1996), Emery *et al.* (2005) and Faithfull (2010).

### Genus *GELIDEA* gen. n.

**Type species:** *Cicada torrida* Erichson, 1842.

**Included species:** AUSTRALIAN: *torrida* (Erichson, 1842), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *gelidus* meaning cold, frosty, icy, and referring to the cool temperate climate in which the type species is found. Feminine.

**Distribution** (Fig. 145e): Southern Victoria from Cape Otway to Wilsons Promontory, the islands of Bass Strait and Tasmania.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, usually with a mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical

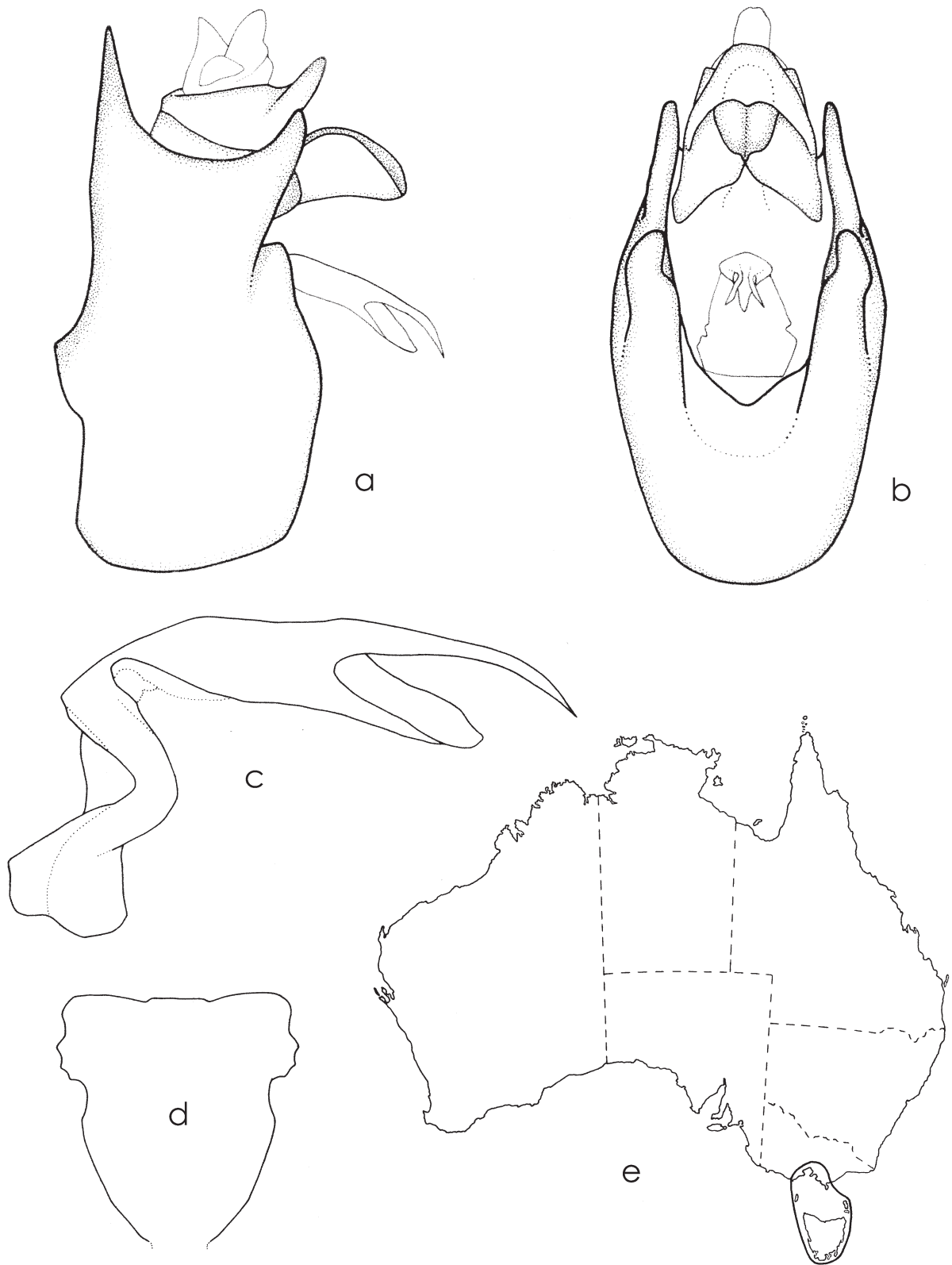
cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA usually meeting basal cell with their stems completely fused as one but independently in some individuals; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation at bases of apical cells 2 and 3 (rarely absent); wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with two long ribs spanning the full height of the timbal; basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 145a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, essentially flat, wide in lateral view, outer face with an overhanging lip along margin; fused around midlength; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present; ventral support of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from all other genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, the paranota with a small lateral tooth, and the timbals with two long ribs. Further, the hind wing plaga of the single species currently placed in this genus is pure white. The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, while the claspers are fused at about midlength, essentially flat, and wide with an overhanging lip along the outer margin.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution, habitat and biology of the single described species in this genus are provided by Moulds (1990). Further notes on the biology of this species can be found in Bashford (1997), Faithfull (2010) and Moss (1989).



**FIGURE 145.** Genus *Gelidea* **gen. n.:** (a) *G. torrida* (Erichson), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution.

## Review of species

### *Gelidea torrida* (Erichson), comb. n.

*Cicada torrida* Erichson, 1842: 286  
*Cicada basiflamma* Walker, 1850: 170  
*Cicada connexa* Walker, 1850: 173  
*Cicada damater* Walker, 1850: 178  
*Melampsalta damater* (Walker): Stål, 1862a: 484  
*Melampsalta torrida* (Erichson): Goding and Froggatt, 1904: 631  
*Melampsalta spinosa* Goding and Froggatt (male, not female): Goding and Froggatt, 1904: 635  
*Melampsalta spreta* Goding and Froggatt, 1904: 647. **Syn. n.**  
*Cicadetta torrida* (Erichson): Dugdale, 1972: 877, 878  
*Cicadetta (Tettigetia) torrida* (Erichson): Boulard, 1991: 119  
*Cicadetta spreta* (Goding and Froggatt): Metcalf, 1963: 388–389

Examination of the male holotype of *spreti* (in MV) and of the male and female syntypes of *torrida* (in MHUB) confirmed that they are conspecific. The holotype of *spreti* has red markings as described by Goding and Froggatt in their description of the species; these are usually absent in *torrida*, especially in males, but are sometimes present. I have material of *torrida* with red markings resembling those of the holotype collected with individuals entirely lacking, or almost lacking, such markings and it is likely that specimens with red are partly teneral.

### Genus *GLAUCOPSALTRIA* Goding and Froggatt

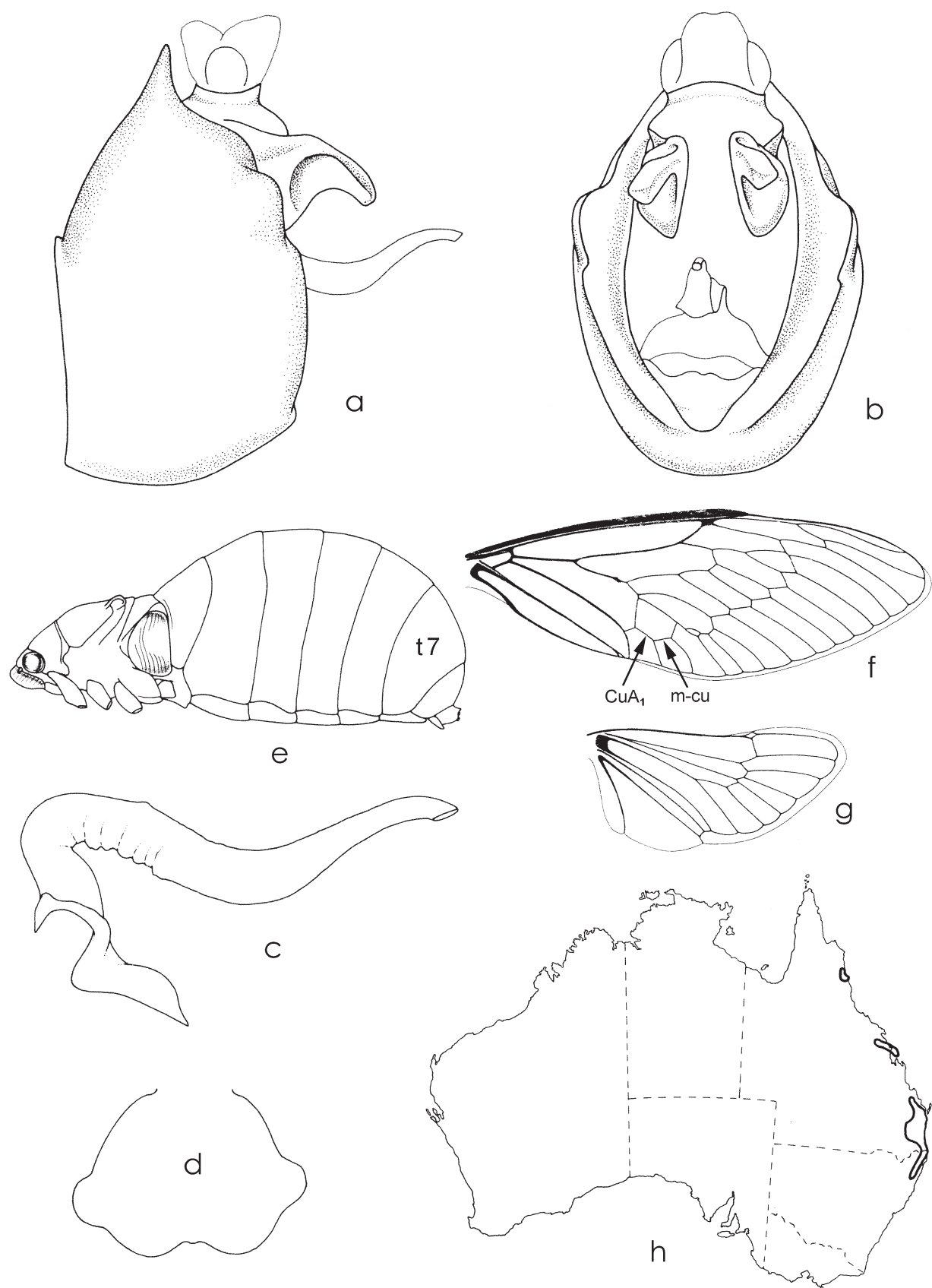
*Glaucopsaltia* Goding and Froggatt 1904: 657; Schulze, Kükenthal and Heider, 1926–40: 1373; Neave, 1939b: 473; Moulds, 1990: 189; de Boer, 1992b: 18, 19, 20, 22; de Boer, 1993a: 16, 17; de Boer, 1993b: 142; de Boer, 1995a: 8; de Boer, 1995b: 204, 211, 214, 215; de Boer, 1995c: 2, 6; de Boer, 1995d: 218, 219, 222, 224, 225, 233; de Boer, 1996: 352, 354, 355; de Boer and Duffels, 1996a: 155, 168, 170, 171; de Boer and Duffels, 1996b: 301, 304; de Boer, 1997: 91, 92, 93, 96, 97, 98, 107, 109; Moulds, 2005a: 390, 413, 430, 435.  
*Glaucocysta* [sic]: Goding and Froggatt 1904: 566 (misspelling).

**Type species:** *Glaucopsaltia viridis* Goding and Froggatt, 1904, by original designation.

**Included species:** AUSTRALIAN: *viridis* Goding and Froggatt, 1904. OTHERS: none.

**Distribution** (Fig. 146h): North-eastern Queensland near Cairns, the Mackay region in central Queensland and south-eastern Queensland to north-eastern NSW (Moulds 1990).

**Diagnosis.** *Head* (Fig. 146e) including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax* (Fig. 146e): pronotal collar width at dorsal midline much less than diameter of eyes; paracosta confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 146f) hyaline; with 13 apical cells (sometimes 12 or 14 if aberrant, but usually so only in one wing); a series of approximately 6 subapical cells; ulnar cell 3 substantially parallel to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma absent; vein CuA nearly straight so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation absent; wing outer margin narrow but developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 146g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A gently curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* distant from lateral margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically tapering to a blunt point, inner margin straight, clearly not meeting. *Male abdomen* (Fig. 146e) markedly inflated, obtuse; tergites in cross-section with sides concave, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs many, and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases.



**FIGURE 146.** Genus *Glaucopsaltria* Goding and Froggatt: (a) *G. viridis* Goding and Froggatt, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, male head and body, lateral view; (f) the same, fore wing; (g) the same, hind wing; (h) generic distribution. CuA<sub>1</sub> first branch of cubitus anterior vein, m-cu mediocubital crossvein, *t7* tergite seven.



*Male genitalia* (Figs 146a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinated pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinated, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Medium-sized cicadas. Distinguished from all other genera by having the combination of a male abdomen that is markedly inflated, substantially hollow and obtuse, fore wings with 13 apical cells (sometimes 12 or 14 if aberrant, but usually so only in one wing) and hind wings with 6 apical cells. Males are clearly distinguished from the closely allied genus *Chlorocysta* by abdominal tergite 7, which is greatly enlarged in *Glaucopsaltria* (Fig. 146e).

**Discussion.** De Boer (1995b) defined the genus and discussed phylogenetic relationships. Phylogenetic relationships are also documented by Moulds (2005a). The distribution and biology of the single species in this genus has been summarised by Moulds (1990). Ewart (1995, 2001b) and Young & Josephson (1983) provide further notes on biology and song analyses.

### Genus *GRAMINITRIGRINA* Ewart and Marques

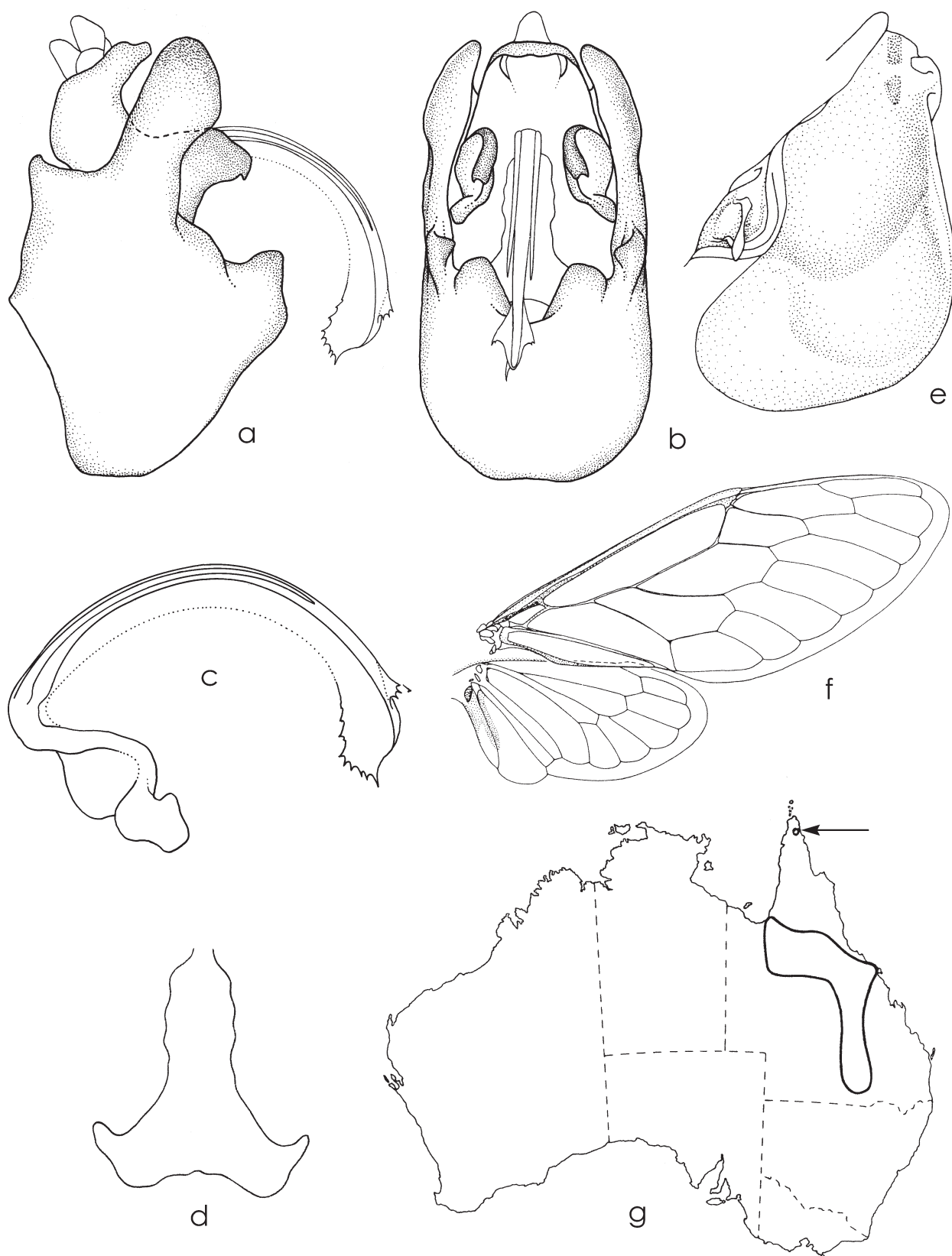
*Graminitrigrina* Ewart and Marques, 2008: 153–155.

**Type species:** *Graminitrigrina bowensis* Ewart and Marques, 2008, by original designation (Pl. 2, fig. 7).

**Included species:** AUSTRALIAN: *boltoni* Ewart and Marques, 2008; *bowensis*, Ewart and Marques, 2008; *carnarvonensis*, Ewart and Marques, 2008; *karumbae* Ewart and Marques, 2008; *triodiae* Ewart and Marques, 2008. OTHERS: none.

**Distribution** (Fig. 147g): Queensland, from northern Cape York Peninsula and from the south-eastern coast of the Gulf of Carpentaria, though much of inland and eastern Queensland east as far as Bowen and south to near St George (Ewart and Marques 2008).

**Diagnosis.** *Head* including eyes a little narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotum in dorsal approximately view parallel-sided; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 147f) hyaline; with 8 apical cells; apical cells 3–6 about equal to or longer than ulnar cells; subapical cells absent; ulnar cell 3 angled to radial cell; radial cell long (about equal to distance from its apex to wing tip); basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; costa of male gently curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal and distal portions about equal (variable a little between individuals); veins CuP and 1A fused in part; infuscation absent except in *G. triodiae* where weak infuscations are present in area of cross veins r and r-m and around apical margin, and in *G. carnarvonensis* where weak infuscations are sometimes present on apical cells 1–6; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 147f) with 5 apical cells (sometimes 4 or 6 if aberrant); no infuscation on ambient vein except sometimes around distal end of 2A; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 147e) reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male*



**FIGURE 147.** Genus *Graminitigrina* Ewart and Marques: (a) *G. bowensis* Ewart and Marques, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, left male operculum; (f) the same, fore and hind wings; (g) generic distribution.

*abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex, swollen so that each is visible in lateral view; a little wider than thorax. *Timbals* usually 4 or 5 long ribs irregular in size and spaced with prominent intermediate short ribs; anterior part of timbal mostly occupied by ribs except in *G. triodiae* and to a lesser extent in *G. bolloni*; large basal dome; timbals not extended below wing bases; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbal covers absent.

*Male genitalia* (Figs 147a–d). Pygofer in ventral view sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes very flat, very large, dominating pygofer between basal lobes and dorsal beak, elongate and tending apically expanded like horse blinkers; basal lobes undivided, large, in lateral view very broad; dorsal beak usually present and a part of chitinized pygofer but very small, sometimes so reduced as to be absent. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large and dominant with sharply-pointed, hooked terminations; restraining aedeagus; unfused. Aedeagus with basal plate in lateral view arched with apical region upturned, deeply depressed on dorsal midline; in dorsal view T-shaped, as long or longer than broad; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate ridged and lacking a 'hinge'; thecal shaft curved in a gentle arc; pseudoparameres present, originating near thecal base, filiform or nearly so, lateral of theca and adjacent to thecal shaft throughout their length; endothecal ventral support absent; thecal apex sclerotised, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening dorsal on theca. *Male reproductive system* unknown.

*Female dorsal beak* small, but not the most distal part of abdominal segment 9. *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from most genera in having fore wing veins M and CuA with their stems completely fused as one, a long fore wing radial cell that is about as long as the distance from its distal end to wing apex, no mid lateral tooth on the paranotum, and a fore wing costa that is broadest a little before the node. Further, the male (Pl. 2, fig. 7) has an abdomen that is clearly wider than the thorax and sternites that are swollen so that at least part of each is visible in lateral view, while the female dorsal beak is small and does not extend beyond the most distal part of abdominal segment 9. *Graminitigrina* is most similar to *Mugadina* from which it differs significantly in the male genitalia which have very large upper pygofer lobes and pseudoparameres that are very long and arise near the base of the theca while those of *Mugadina* are short and arise subapically.

The male genitalia are distinctive in having the combination of a large blinker-shaped upper pygofer lobe, a large basal lobe, an auxiliary inward-facing 'tooth' immediately above the basal lobe and an aedeagus that lacks a flexible junction between the theca and basal plate. The absence of pseudoparameres in *G. bowensis* and *G. karumbae* as recorded by Ewart and Marques (2008) was an oversight.

**Discussion.** Notes on the species of this genus including analyses of their songs are provided by Ewart and Marques (2008).

## Genus *GUDANGA* Distant

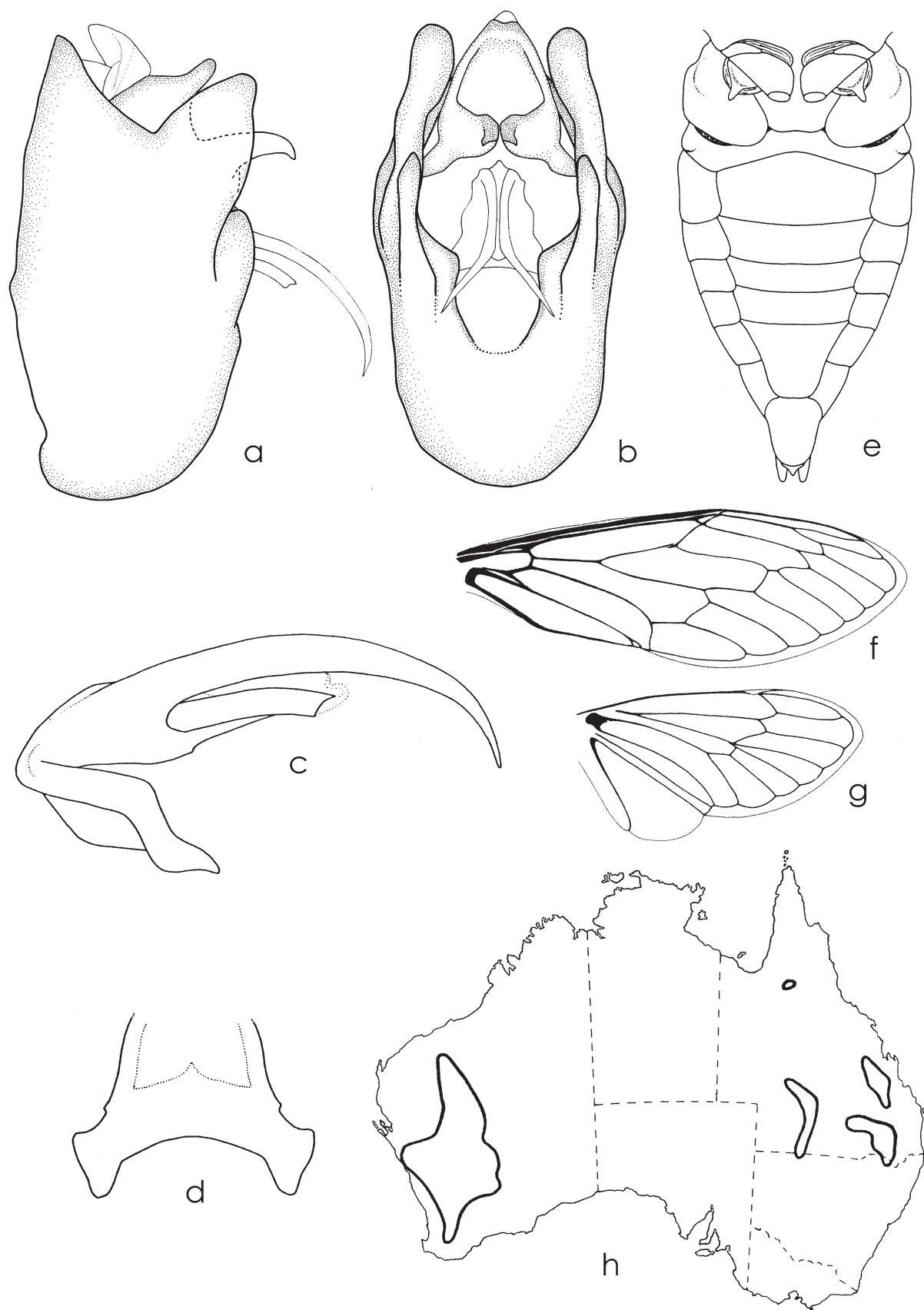
*Gudanga* Distant, 1905f: 204, 208; Distant, 1906d: 140, 146; Distant, 1913a: 489; Deletang, 1923: 627; Schulze, Kükenthal and Heider, 1926–40: 1421; Kato, 1932: 177, 178; Neave, 1939a: 523; Kato, 1956: 69, 81; Burns, 1957: 641; Metcalf, 1963: 179; Duffels and van der Laan, 1985: 228; Moulds, 1990: 116–117; Moulds, 1996: 19–20; Moulds, 2005a: 377, 392, 423, 424, 430, 436.

*Paragudanga* Distant, 1913a: 488–489; Ashton, 1914a: 350; Schulze, Kükenthal and Heider, 1926–1940: 2496; Neave, 1940a: 571; Burns, 1957: 641; Metcalf, 1963: 185; Duffels and van der Laan, 1985: 229; Moulds, 1990: 116.

**Type species:** *Gudanga boulayi* Distant, 1905, by original designation (Pl. 1, fig. 4).

**Included species:** *adamsi* Moulds, 1996; *aurea* Moulds, 1996; *boulayi* Distant, 1905; *browni* (Distant, 1913); *kalgoorliensis* Moulds, 1996; *pterolongata* Olive, 2007; *solata*, Moulds, 1996. OTHERS: none.

**Distribution** (Fig. 148h): South-western quarter of Western Australia, northern Queensland between Croydon and Georgetown, and inland southern Queensland (Moulds 1996, Olive 2007). All records are from areas receiving from 200–750 mm annual average rainfall.



**FIGURE 148.** Genus *Gudanga* Distant: (a) *G. boulayi* Distant, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, underside of male body showing opercula; (f) the same, fore wing; (g) the same, hind wing; (h) generic distribution.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 148f) strongly pigmented, opaque, black to dark brown; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; vein CuA weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscations lacking but veins mostly highlighted jet black; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 148g) with basal portion pigmented orange or red; 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 148e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* (Fig. 148e) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.

*Male genitalia* (Figs 148a–d). Pygofer with distal shoulders not developed; upper lobes very flat, very well developed, dominating pygofer between basal lobes and dorsal beak; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate with a functional 'hinge'; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base; endotheca exposed, ridged, in part or entirely chitinized; endothecal ventral support present; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** A distinctive genus with fore wings and veins strongly tinted opaque black to dark brown; hind wings bearing bright orange or red suffusion basally. The male pygofer possesses very large, broad, subtriangular upper lobes and a very broad dorsal beak, characters otherwise found only in some *Pauropsalta*. The aedeagus is unusual (but not unique) in having a theca that is typically 'trifid' but with an endotheca that is sclerotized rather than soft and fleshy.

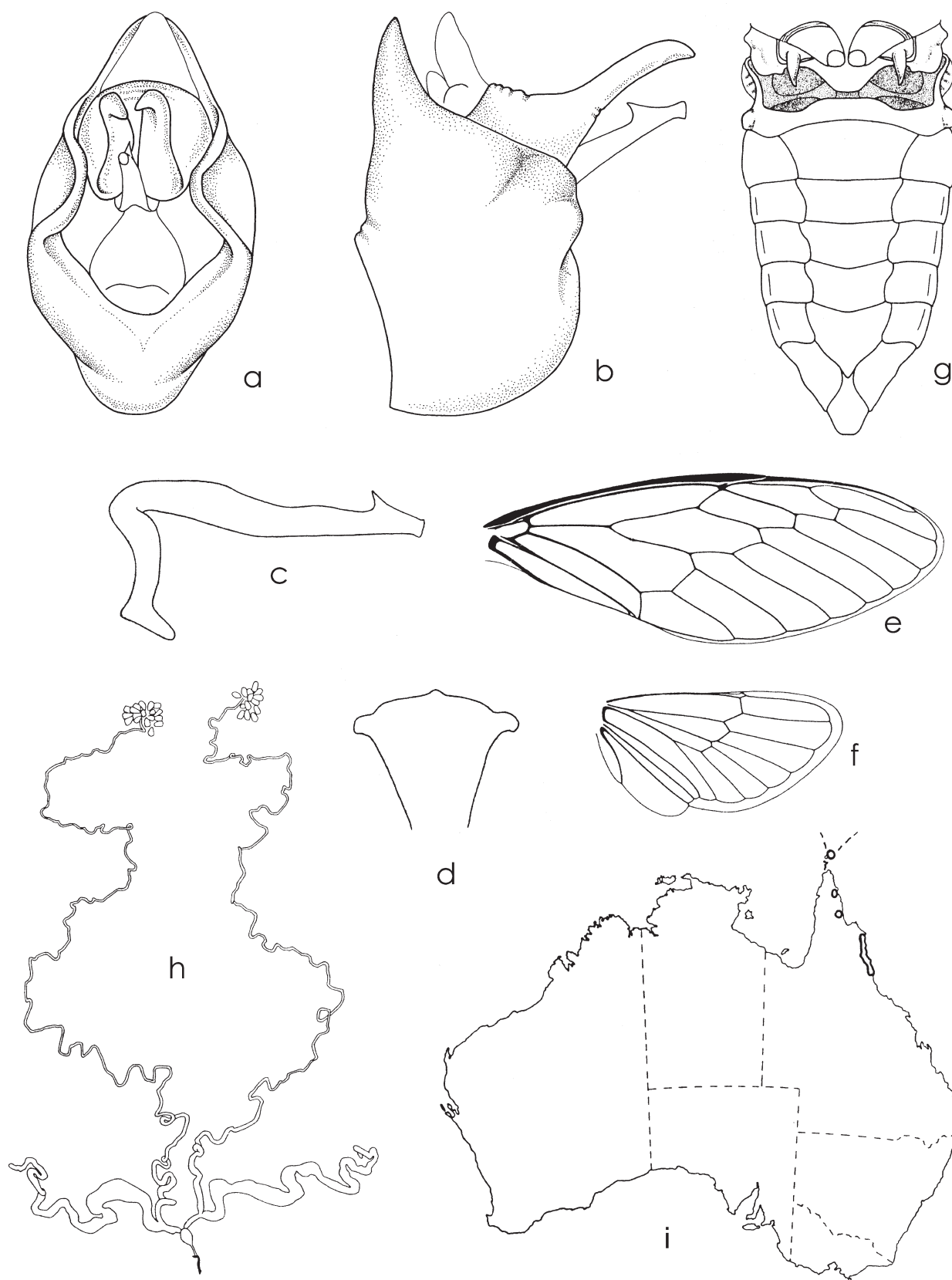
**Discussion.** Small cicadas. The relationship between *Gudanga* and other Australian genera is documented in a cladistic analysis by Moulds (2005a); *Gudanga* falls as the sister to all other Cicadettini included in the analysis. Relationships between *Gudanga* and the South-east Asian tribe Huechysini are discussed by Moulds (1996), who concluded that the superficial appearance between the two is misleading and there is no close relationship. The type species of the genus has characteristic red colouration at the base of the wings (Pl. 1, fig. 4).

Species of the genus have been reviewed by Moulds (1990, 1996) and Olive (2007). An analysis of the song of *G. adamsi* can be found in Ewart (1998a). Notes and a song analysis of an undescribed *Gudanga* species from Queensland are provided by Ewart & Popple (2001).

### Genus *GUINEAPSALTRIA* de Boer

*Guineapsaltia* de Boer, 1993a: 15–23; de Boer, 1995b: 204, 210, 211, 214, 215, 216, 217, 218, 219; de Boer, 1995c: 2, 3, 5, 6; de Boer, 1995d: 208–209, 217, 218, 219, 222, 224, 225, 233; de Boer, 1996: 351, 352, 356, 358; de Boer and Duffels, 1996a: 155, 167, 168, 170, 171, 172; de Boer and Duffels, 1996b: 301, 304, 306, 313, 314; de Boer, 1997: 92, 93, 94, 98; Moulds, 2005a: 390, 430, 435.





**FIGURE 149.** Genus *Guineapsaltria* de Boer: (a) *G. flava* (Goding and Froggatt), male genitalia, ventral view; (b) the same, male genitalia, lateral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) underside of male body showing opercula; (h) the same, male reproductive system, dissection with aedeagus removed from pygofer; (i) generic distribution in Australia.

**Type species:** *Tibicen flava* (Goding and Froggatt, 1904), by original designation.

**Included species:** AUSTRALIAN: *flava* (Goding and Froggatt), 1904. OTHERS: *chinae* (Blöte, 1960); *flavola* de Boer, 1993; *pallida* (Blöte, 1960); *pallidula* de Boer, 1993; *pennyi* de Boer, 1993; *stylata* (Blöte, 1960); *viridula* (Blöte, 1960).

**Distribution** (Fig. 149i): In Australia confined to the islands of Torres Strait and far north-eastern Queensland south to Mission Beach (Moulds 1990). Beyond Australia confined to New Guinea and adjacent islands.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 149e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma absent; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 149f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 149g) distant from lateral margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically tapering to a blunt point, inner margin straight, far from meeting. *Male abdomen* (Fig. 149g) in cross-section with sides of tergites concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* ribs many and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 149a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; theca with prominent dorsal subapical protrusion that is usually directed backwards, thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 149h) with accessory glands short.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas uniformly coloured green, yellow or reddish and for the most part without body or wing markings. Within the Australian fauna readily distinguished by its uniform green coloration (there is also a rare orange-yellow form), small size (fore wing never above 20 mm), lack of fore wing subapical cells and almost total lack of a fore wing margin.

The genus is distinguished primarily on male genitalic characters. A large dorsal subapical protrusion on the aedeagus is regarded as apomorphous (Fig. 149c) (de Boer 1993a).

**Discussion.** The genus has been reviewed by de Boer (1993a) and its phylogenetic placement is discussed by de Boer (1995b, 1997) and Moulds (2005a). De Boer and Duffels (1996a) consider the origin of *Guineapsaltria* as most likely from northern New Guinea with dispersal to the Papuan peninsula and subsequently to Australia.

The distribution and biology of the single Australian species in this genus has been summarised by Moulds (1990).

### Genus *GYMNOTYMPANA* Stål

*Gymnotympana* Stål, 1861: 619; Marshall, 1873: 365; Distant, 1892: 103, 123; Distant, 1905f: 213, 214; Distant, 1905h: 563; Distant, 1906a: 388; Distant, 1906d: 153, 157; Schulze, Kükenthal and Heider, 1926–40: 1432; Kato, 1932: 183; Neave, 1939b: 534; Kato, 1956: 70; Metcalf, 1963: 252–254; Boulard, 1975: 315; Duffels, 1977: 205, 207; Boulard, 1979a: 35;

Holloway, 1979: 235; Duffels and van der Laan, 1985: 250; Duffels, 1988b: 7; de Boer, 1990: 64; de Boer, 1991: 1–4; de Boer, 1992b: 18–20, 23; de Boer, 1993a: 16–17; de Boer, 1993b: 141–143; de Boer, 1995a: 1–81; de Boer, 1995b: 213–214, 215; de Boer, 1995c: 2, 5, 6, 7; de Boer, 1995d: 202, 205, 206, 207, 208, 214, 217, 218, 219, 222, 224, 225, 229, 230, 233, 234, 235, 236, 237; de Boer, 1996: 352, 353, 354, 355, 356, 358; de Boer and Duffels, 1996a: 155, 159, 163, 164, 165, 166, 167, 170, 171, 172, 173; de Boer and Duffels, 1996b: 301, 304, 306, 312, 313, 316, 318; de Boer, 1997: 91, 92, 93, 94, 98.; Moulds, 2005a: 390, 392, 412, 413, 430, 435.

**Type species:** *Cicada strepitans* Stål, 1861, by subsequent designation by Distant, 1905g: 214.

**Included species:** AUSTRALIAN: *rufa* (Ashton, 1914); *varicolor* (Distant, 1907). OTHERS: *dahli* (Kuhlgatz, 1905); *hirsuta* de Boer, 1995; *langeraki* de Boer, 1995; *membrana* de Boer, 1995; *minoramembrana* de Boer, 1995; *montana* de Boer, 1995; *nigravirgula* de Boer, 1995; *obiensis* de Boer, 1995; *olivacea* Distant 1905; *parvula* de Boer, 1995; *phyloglycera* de Boer, 1995; *rubricata* (Distant, 1897); *stenocephalis* de Boer, 1995; *strepitans* (Stål, 1861); *stridens* (Stål, 1861); *subnotata* (Walker, 1868); *verlaani* de Boer, 1995; *viridis* de Boer, 1995.

**Distribution** (Fig. 150i): New Guinea, northern Maluku, the Bismarck Archipelago, the D'Entrecasteaux Islands, the Louisiade Archipelago, Woodlark Island and north-eastern Queensland (de Boer 1995a).

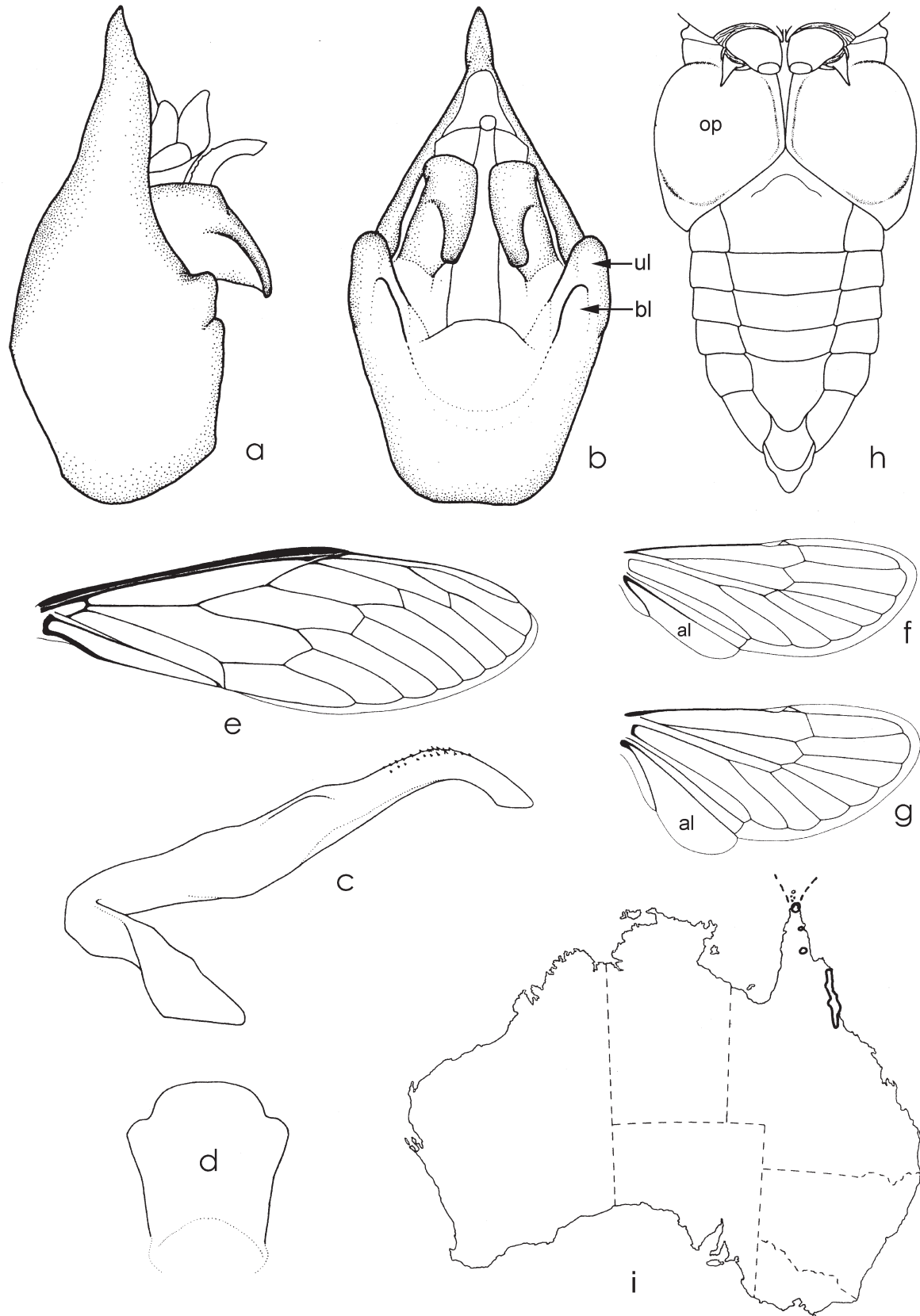
**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 150e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma absent; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Figs 150f, g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe narrow (very narrow in males) with vein 3A straight, short, adjacent to wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 150h) distant from lateral margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically tapering to a blunt point, inner margin straight, either meeting as in the type species or spaced apart as in the two Australian species. *Male abdomen* (Fig. 150h) in cross-section with sides of tergites concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VI in cross-section convex. *Timbal* covers absent; timbal ribs many and regular in size and closely spaced filling entire timbal area apart from the small basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 150a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present, large and pointed, and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Males can be distinguished from other Chlorocystini by having the hind wing anal lobe very narrow. The male genitalia have a very robust, long, and pointed dorsal beak. Females differ from other Australian Chlorocystini by having 8 apical cells in the fore wing in conjunction with a very abrupt narrowing of the subcostal vein beyond the node. Males of the two Australian species differ from all others in the genus by having a broad, bright red median ventral band on the abdomen; otherwise they are primarily green in colour.

De Boer (1995a) has revised *Gymnotympana* in detail and redefined its concept. He comments that the genus comprises a rather heterogeneous group of species, the differences being manifold and striking. Most of the charac



**FIGURE 150.** Genus *Gymnotympana* Stål: (a) *G. rufa* (Ashton), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, male fore wing; (f) the same, male hind wing; (g) *G. varicolor* (Distant), female hind wing; (h) *G. strepitans* (Stål), underside of male body showing opercula; (i) generic distribution in Australia. *al* anal lobe, *bl* basal lobe, *op* operculum, *ul* upper lobe.

ters that are typical of *Gymnotympana* are not shared by all of its species although sufficient are retained by all species to indicate close relationships (de Boer 1995a: 3). One character only is shared by all species, a very narrow anal area to the hind wing in the males; females have much larger anal areas as found in both sexes of related groups.

**Discussion.** De Boer (1995a) resolves the phylogenetic positions for all species in the genus, concluding that the two Australian species form a sister group relationship with all others. He also concludes that *Gymnotympana* and *Venustria* may be sister groups. While the phylogenetic position of *Venustria* is not unambiguous, the bubble-like shape of the basal part of the male opercula (remnant of epimeron 3) indicates a monophyletic origin with the two Australian species of *Gymnotympana*. Broader phylogenetic relationships are also documented by de Boer (1995b) and Moulds (2005a).

The distribution and biology of the two Australian species in this genus have been summarised by Moulds (1990).

### Genus *HELIOPSALTA* gen. n.

**Type species:** *Cicadetta polita* Popple, 2003 (Pl. 1, fig. 8).

**Included species:** *polita* (Popple, 2003), **comb. n.**

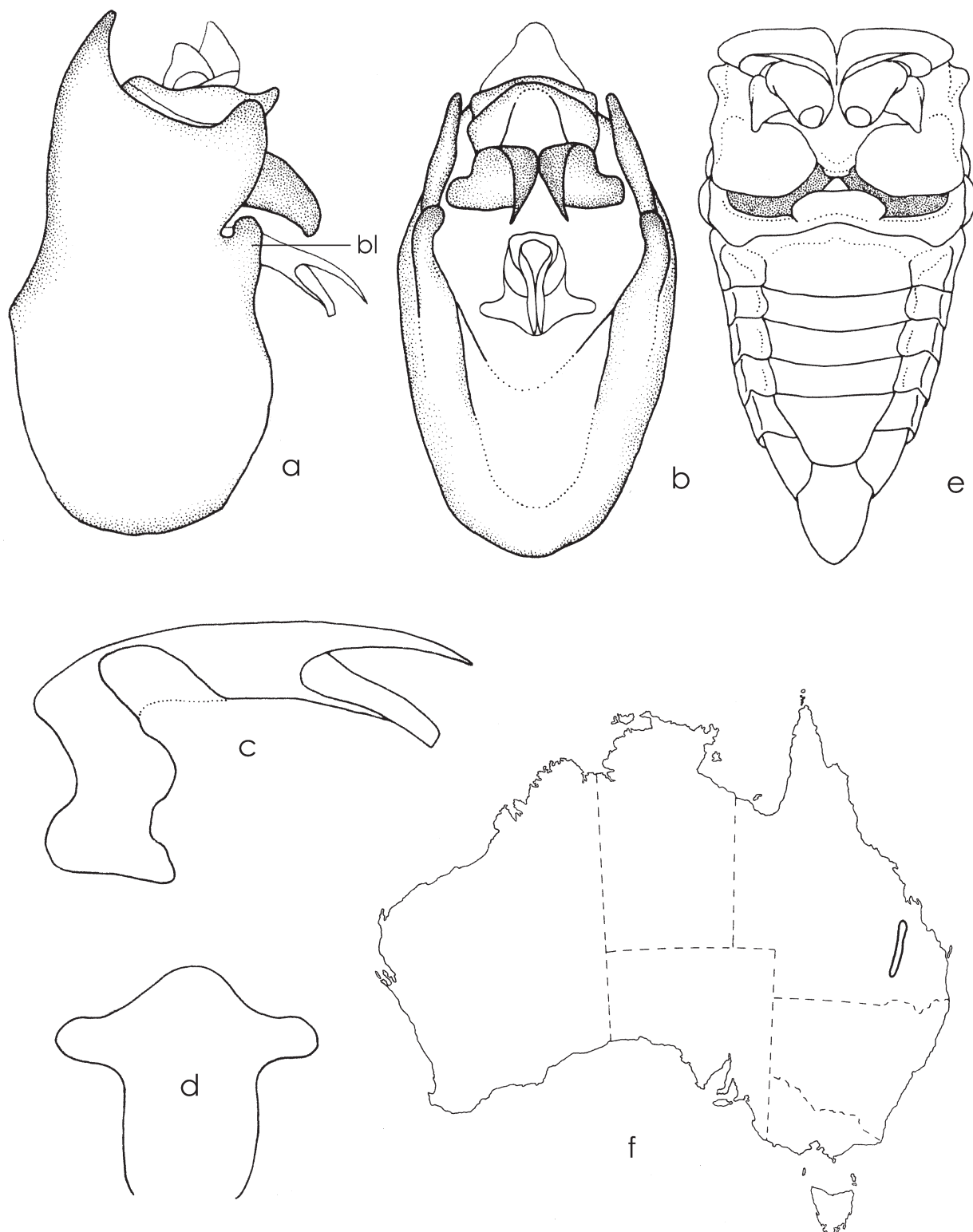
**Etymology.** From the Greek *helios*, the sun, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 151f): Inland south-eastern Queensland, south from the Edungalbra district (some 80 km SW of Rockhampton) to Glenmorgan (some 120 km SE of Roma).

**Diagnosis.** *Head* including eyes a little wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 151e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* (Fig. 151e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbal* covers absent; timbals with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases.

*Male genitalia* (Figs 151a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, clear of pygofer margin; dorsal beak present as a





**FIGURE 151.** Genus *Heliopsalta* **gen. n.:** (a) *H. polita* (Popple), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) underside of male body showing opercula; (f) generic distribution. *bl* basal lobe.

developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad; apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft straight or curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view converging throughout their length, in lateral view aligned with thecal shaft but gently curved down throughout its length, proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the paranota are confluent with adjoining pronotal sclerites and lack a mid lateral tooth, and the timbal cavity posterior margin is ridged on its lower half or so. These characteristics distinguish *Heliopsalta* from most other genera. The single known species in this genus is darkly coloured with a distinctive orange pronotal colour (Pl. 1, fig. 8).

Distinguished from all genera by the male genitalia which have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, pseudoparameres that converge throughout their length and a basal lobe that sits clear of the pygofer margin in lateral view (Fig. 151a).

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis included in the introductory part of this paper. Notes on the type species, including its distribution and an analysis of its song, are included in Popple (2003).

### Genus *HENICOPSALTRIA* Stål

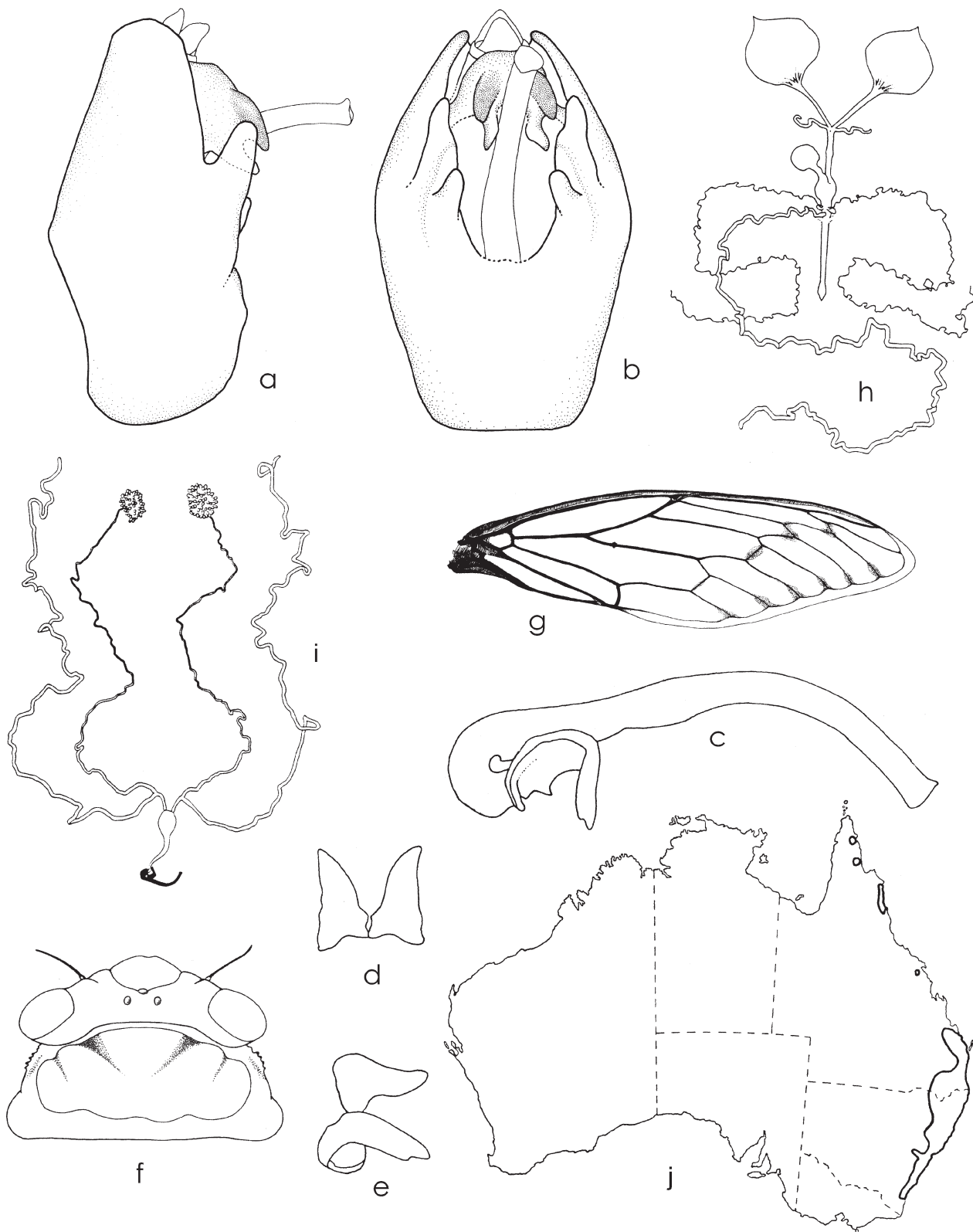
*Henicopsaltia* Stål, 1866a: 7; Stål, 1866b: 171; Dallas, 1867: 210, 557; Marschall, 1873: 366; Distant, 1882: 125; Atkinson, 1886: 178; Kirby, 1896: 458; Distant, 1904a: 302, 303; Goding and Froggatt, 1904: 564, 567, 573; Distant, 1906d: 27, 29; Froggatt, 1907: 350; Distant, 1910: 417; Ashton, 1912b: 24; Distant, 1912a: 22, 24; Ashton, 1914a: 347; Ashton, 1921: 96, 97; Tillyard, 1926: 162; Schulze, Kükenthal and Heider, 1926–40: 1518; Myers, 1928a: 59; Kato, 1932: 153; Neave, 1939b: 618; Cooper, 1941: 295; Kato, 1956: 66, 79; Burns, 1957: 619; Metcalf, 1963: 156; Moulds, 1978: 225–228; Duffels and van der Laan, 1985: 54; Moulds, 1990: 68; Moulds, 1993: 23; Moulds, 205a: 377, 387–389, 391, 413, 423, 430, 431.

**Type species:** *Cicada eydouxii* Guérin-Méneville, 1838, by subsequent designation by Distant 1904a: 303.

**Included species:** AUSTRALIAN: *danielsi* Moulds, 1993; *eydouxii* (Guérin-Méneville, 1838); *kelsalli* Distant, 1910; *rufivelum* Moulds, 1978. OTHERS: none.

**Distribution** (Fig. 152j): Eastern Queensland south from Iron Range on Cape York Peninsula and eastern NSW south to Narooma on the far South Coast (Moulds 1990).

**Diagnosis.** *Head* (Fig. 152f) including eyes about as wide as mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate in *H. eydouxii*, less so in other species; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 152f): pronotal collar width at dorsal midline much less than diameter of eyes; paranota marginally ampliate, no mid lateral tooth but in all species except *H. kelsalli* margin partly finely serrate; cruciform elevation with its dome wider than long; epimeral lobe reaching or almost reaching operculum. *Fore wings* (Fig. 152g) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no



**FIGURE 152.** Genus *Henicopsaltria* Stål: (a) *H. eydouxii* (Guérin-Ménéville), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, basal plate, dorsolateral view, apex at right; (f) same species, head and pronotum, dorsal view; (g) *H. rufivelum* Moulds, fore wing; (h) *H. eydouxii*, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (i) the same, male reproductive system, dissection with aedeagus removed from pygofer; (j) generic distribution.

larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscations overlaying veins on some species, at bases of some or all apical cells 2–8, also at extremities of longitudinal veins near ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* covering rim of distal margin of tympanal cavity, reaching to or beyond sternite III, overlapping, lateral margin very long and straight. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 enlarged, accounting for approximately half abdominal length; sternites III–VII in cross-section convex. *Timbal* covers present, flat, fully rounded dorsally and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 152a–e). Pygofer with distal shoulders broad, rounded, the most distal part of pygofer; upper lobes thickened, well developed; basal lobes undivided, dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe finger-like, broad and long, apically divided into a pair of large lobes, a similar but usually smaller pair of lobes ventrally, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 152i) accessory glands long.

*Female reproductive system* (Fig. 152h) ditrysian; accessory glands of common oviduct short, no longer than common oviduct.

**Distinguishing characters.** Medium to large cicadas. Within the Australian fauna, males are characterised by a narrow pronotal collar in conjunction with the fully developed and tightly closed timbal covers that do not overlap the opercula. Females can be distinguished by their large eyes (widest diameter of eye about equal to, or greater than, the distance from eye to lateral ocellus), a narrow pronotal collar that is finely serrate along part of lateral margin, and a very long slender pointed end to the abdomen.

The male genitalia are distinctive in having the uncus apically divided into a pair of long, nearly parallel, robust lobes plus a ventral pair of similar but smaller lobes; the latter secure the aedeagus.

Nymphs have the hind tibiae with a spinal crown that includes one very dominant flat spine, a character otherwise found only in *Tettigarcta*.

**Discussion.** Phylogenetic relationships of the genus are documented by Moulds (2005a) in a cladistic analysis incorporating *H. eydouxii* and *H. rufivelum* as representatives of the genus. The distribution and biology of the species in this genus have been summarised by Moulds (1978, 1990, 1993). Notes on seasonal occurrence and plant association of *H. eydouxii* in western Sydney are provided by Emery *et al.* (2005). Further notes on species including song analyses are provided by Ewart (1995), Moulds (1990) and Young (1973).

## Genus *ILLYRIA* Moulds

*Illyria* Moulds, 1985: 25–26; Moulds, 1990: 107; Moulds, 2005a: 387, 390, 423, 430, 431.

**Type species:** *Tibicen burkei* Distant, 1882, by original designation.

**Included species:** AUSTRALIAN: *australensis* (Kirkaldy, 1909); *burkei* (Goding and Froggatt, 1904); *hilli* (Ashton, 1921), *major* Moulds, 1985. OTHERS: none.

**Distribution** (Fig. 153h). Throughout much of the northern half of Australia but excluding far south-western Queensland and the far south of Northern Territory (Moulds 1990).

**Diagnosis.** *Head* (Fig. 153f) including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plates; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3, and in most species also 4, 5, 7 and sometimes 6, also most species with infuscations at extremities of longitudinal veins near ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* covering rim of distal margin of tympanal cavity, reaching to or a little beyond level of distal margin of tergite 2, overlapping. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VI in cross-section convex. *Timbal* covers present, flat, fully rounded dorsally and extending almost to metathorax but not tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

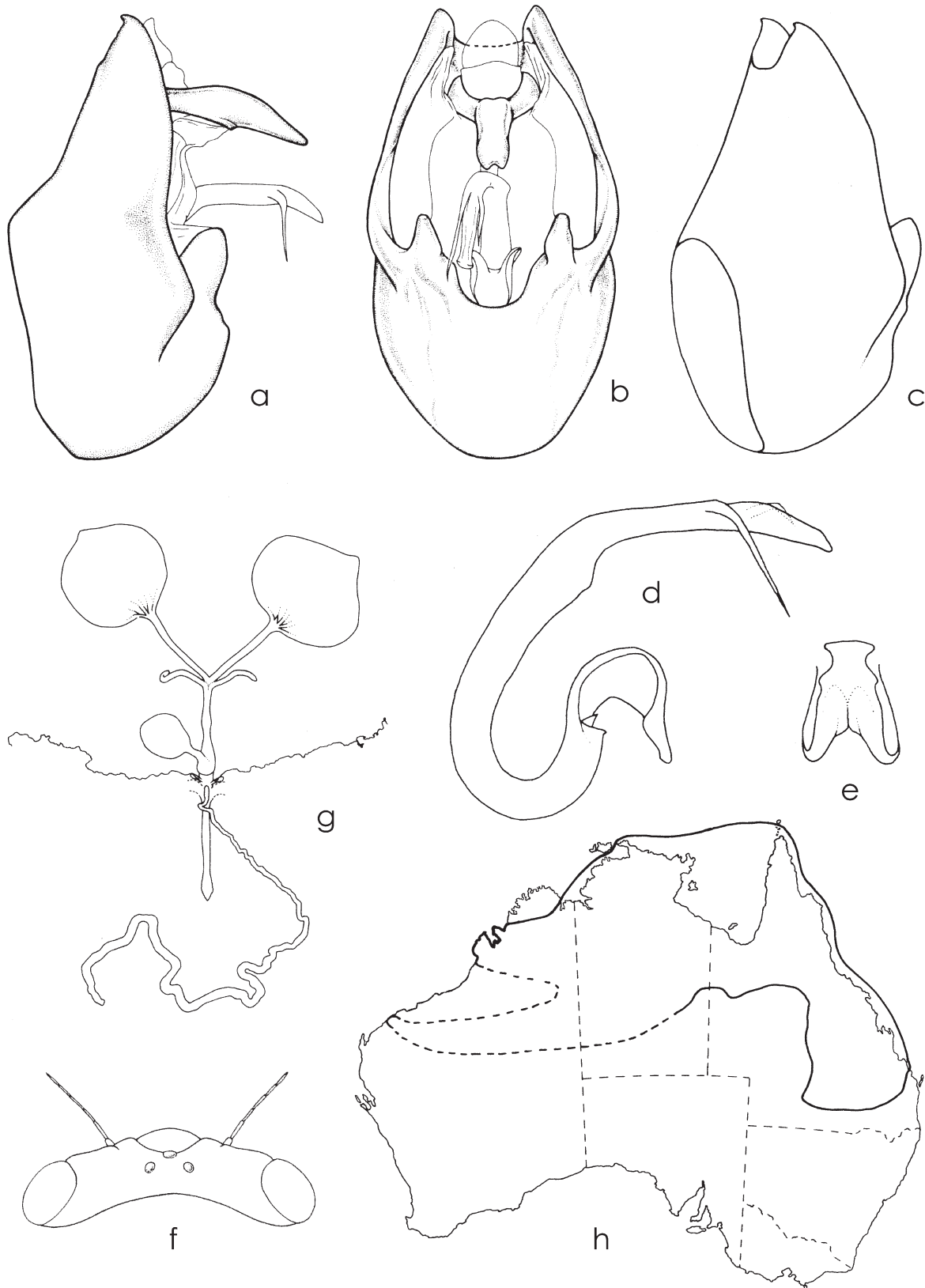
*Male genitalia* (Figs 153a–e). Pygofer with distal shoulders distally extended into pointed, and apically upturned, lobe; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe finger-like, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci present; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown. *Female abdominal segment* 9 long, dorsal midline at least equal in length to abdominal tergites 2, 3, and 4; ovipositor sheath protruding marginally. *Female reproductive system* (Fig. 153g) ditrysian; accessory glands of common oviduct short, no longer than common oviduct.

**Distinguishing characters.** Small to medium-sized cicadas. The wide head (with protruding eyes that are clearly wider than mesonotum), a narrow pronotal collar (significantly less than diameter of eyes) and fore wing infuscations at bases of apical cells 2 and 3, help delineate this genus. It differs from the superficially similar genus *Burbunga* by having male timbal covers large (almost reaching metathorax, instead of very short) and females with a long abdominal segment 9 (dorsal midline at least as long as abdominal tergites 2, 3 and 4, instead of 2 and 3 only).

The male genitalia are distinctive, possessing a pygofer with greatly extended distal shoulders that are upwardly turned at their apices, basal lobes that are large, broad and outwardly directed, and a theca bearing a pair of subapical cerci.

**Discussion.** Phylogenetic relationships of this genus have been documented by Moulds (2005a) in a cladistic analysis in which the type species is represented. The distribution and biology of the species in this genus have been summarised by Moulds (1985, 1990). Additional notes on *I. burkei*, including song analyses, can be found in Burwell (1991), Ewart (1993), 1998a, 2005b), Ewart & Popple (2001) and Popple & Strange (2002).





**FIGURE 153.** Genus *Illyria* Moulds: (a) *I. burkei* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, pygofer showing absence of dorsal beak; (d) aedeagus, lateral view; (e) the same, basal plate, dorsal view, apex at top; (f) the same, head, dorsal view; (g) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic (h) generic distribution.

## Genus *JASSOPSALTRIA* Ashton

*Jassopsaltria* Ashton, 1914a: 350; Burns, 1957: 641; Metcalf, 1963: 171; Duffels and van der Laan, 1985: 225; Moulds, 1990: 111; Moulds 2005a: 392, 413, 416, 424, 425, 430, 431, 433.

**Type species:** *Jassopsaltria rufifacies* Ashton, 1914, by monotypy.

**Included species:** AUSTRALIAN: *rufifacies* Ashton, 1914. OTHERS: none.

**Distribution** (Fig. 154h): Western Australia from near Geraldton, near Guilderton and inland at Cue (Moulds 1990).

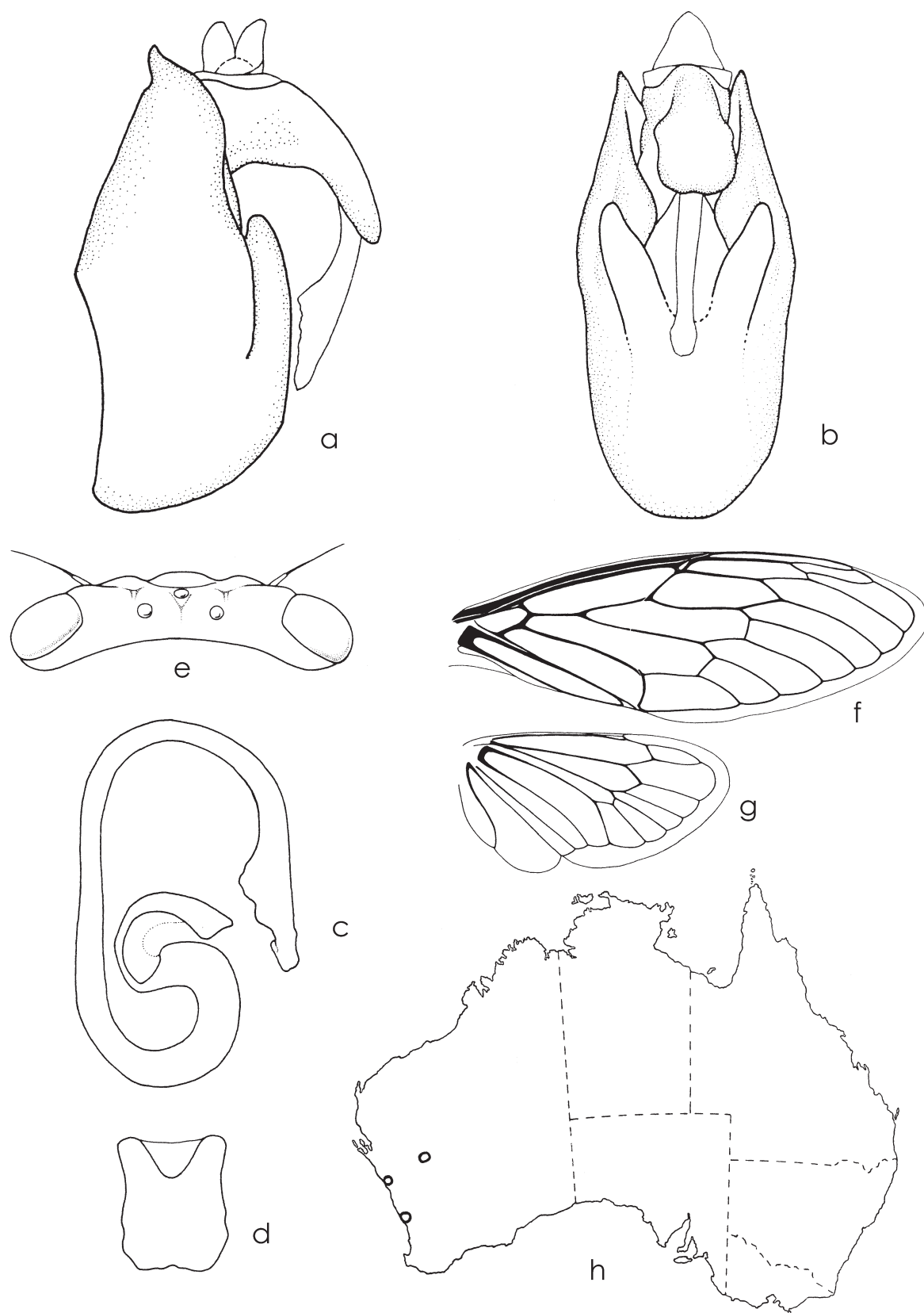
**Diagnosis.** *Head* (Fig. 154e) including eyes wide, clearly wider than mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 154f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 154g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less confluent with distal margin of tympanal cavity, well developed towards abdominal midline with sharply rounded apex facing midline, clearly separated. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers present, flat, reduced dorsally and far from reaching metathorax, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 154a–d). Pygofer with distal shoulders distally extended into pointed, and often apically up-turned, lobe; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak absent (but present in female). Uncus undivided and dominated by median lobe; median lobe finger-like, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, '6' shaped; pseudoparameres absent; thecal apex chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female ovipositor sheath* barely protruding distally. *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to very small cicadas. Distinguished by the following combination of characters: a broad head that is wider than the mesonotum, and a supra-antennal plate that is produced apically into a pointed lobe. The body is remarkably squat, especially in the male, and the male's epimeral lobe does not reach the operculum.

The male aedeagus is unique among Australian genera in its basal '6' shape and 'U' shaped distal half (Fig. 154c). The distal shoulders are well developed with pointed apices.



**FIGURE 154.** Genus *Jassopsaltria* Ashton: (a) *J. rufifacies* Ashton, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) generic distribution.

**Discussion.** This genus forms a monotypic tribe, the Jassopsaltriini. The phylogenetic relationships of this genus have been discussed in Moulds (2005a). The distribution and biology of the single species included here have been summarised by Moulds (1990).

### Genus *KIKIHIA* Dugdale

*Kikihia* Dugdale, [1972]: 861, 862, 874–5, 879, 880; Fleming, 1973: 315, 316; Fleming, 1975a: 48, 50–52, 57, 61–63; Fleming, 1975b: 299, 300, 302, 303, 304; Fleming 1975c: 1592; Wise, 1977: 73; Fleming, 1984: 191, 192–193, 202, 204, 205; Duffels and van der Laan, 1985: 303; Lane, 1993: 53; Lane, 1995: 367, 373, 378, 379, 382, 383, 388, 390, 392, 396, 404, 405, 407–409; Buckley, *et al.*, 2002: 4, 5, 6, 10, 13, 15; Arensburger, *et al.*, 2004a: 557–566; Arensburger, Simon and Holsinger, 2004: 1769–1779; Moulds, 1990: 170; Moulds, 2005a: 390, 410, 415, 430, 436; Buckley and Simon, 2007: 423, 431; Marshall, *et al.* 2008: 1054–1066; Marshall, *et al.*, 2009: 1997, 2006.

**Type species:** *Cicada subalpina* Hudson, 1891, by original designation.

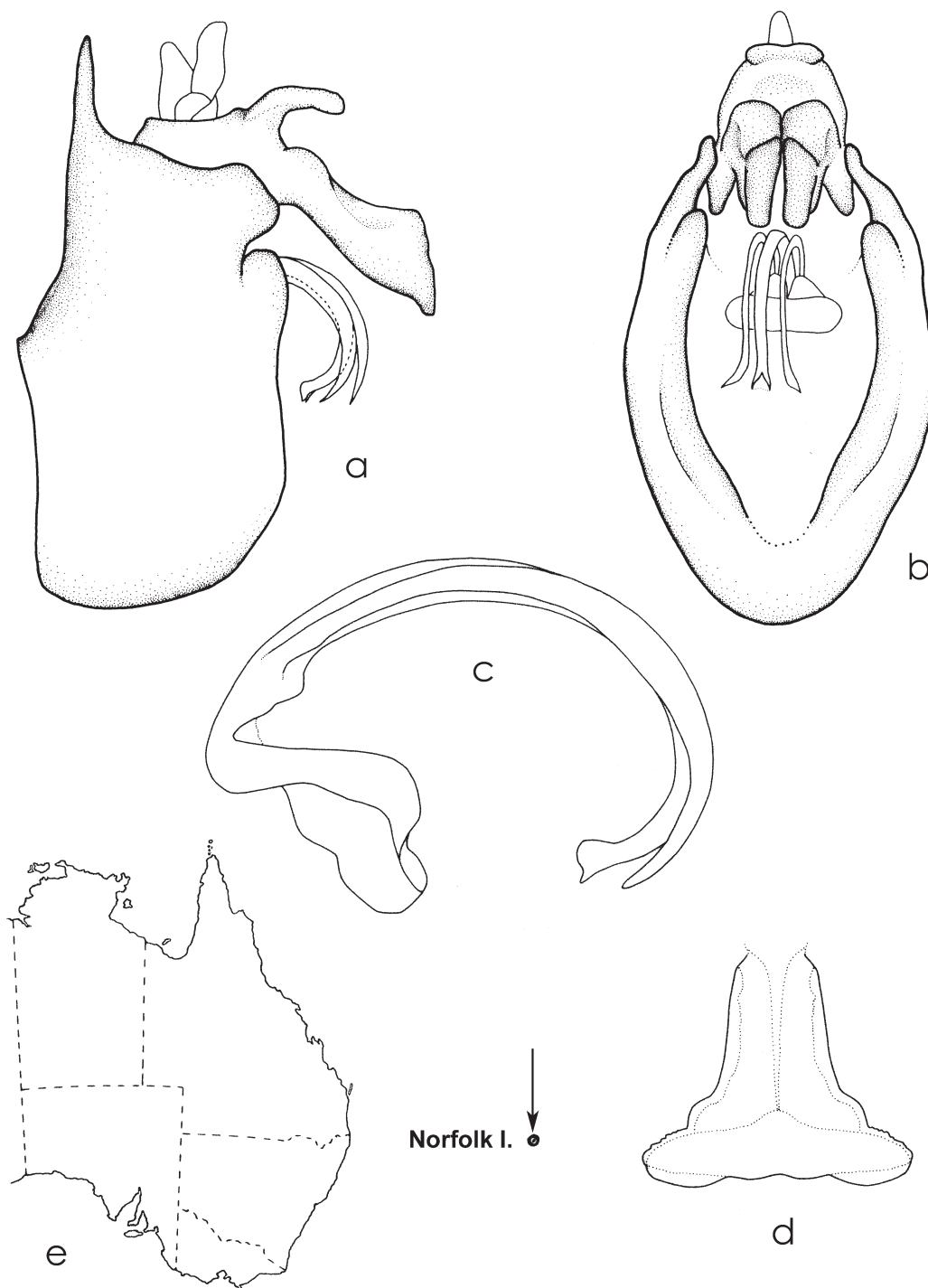
**Included species:** AUSTRALIAN: *convicta* (Distant, 1892). OTHERS: *angusta* (Walker, 1850); *cauta* (Myers, 1921); *convicta* (Distant, 1892); *cutora* (Walker, 1850); *dugdalei* Fleming 1984; *exulis* (Hudson, 1950); *horologium* Fleming, 1984; *laneorum* Fleming, 1984; *longula* (Hudson, 1950); *muta* (Fabricius, 1775); *ochrina* (Walker, 1858); *paxillulæ* Fleming, 1984; *rosea* (Walker, 1850); *scutellaris* (Walker, 1850); *subalpina* (Hudson, 1891).

**Distribution** (Fig. 155e): Within Australia known only from Norfolk Island; otherwise restricted to New Zealand.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, usually not meeting but touching in some species, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.

*Male genitalia* (Figs 155a–d). Pygofer with distal shoulders not developed; upper lobes flat, small to moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view downturned at distal end; in dorsal view T-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft curved in an arc, sickle-shaped; pseudoparameres present, entirely lateral of theca, very long, slender and flat, following line of theca; thecal apex entirely chitinized, bifurcate; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.



**FIGURE 155.** Genus *Kikihia* Dugdale: (a) *K. subalpina* (Hudson), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution in Australia.

**Distinguishing characters.** Small cicadas. Dugdale [1972] distinguished the genus primarily on genitalic structures, particularly the shape of the male theca which is evenly but strongly curved and somewhat sickle-shaped with a bifurcate apex. Also, the pseudoparameres are long, flat, laterally adjacent to the theca and reach the distal end of the theca. Further, the aedeagus lacks a basal hinge and the basal plate is downturned at its distal end in lateral view and T-shaped in dorsal view. Females cannot be distinguished from many other genera of Cicadettini.



**Discussion.** The only Australian species in this genus, *K. convicta*, is restricted to Norfolk Island; the other 13 species are confined to New Zealand. Notes on *K. convicta*, including its phylogenetic relationships and song, are provided by Arensburger, Simon and Holsinger (2004), Buckley and Simon (2007) and Marshall *et al.* (2008), and Moulds (1990). Marshall *et al.* (2011) provide a detailed analysis of New Zealand *Kikihia* species and their hybridization zones including molecular phylogenies and song analyses. Fleming (1975a) also provides analyses of song structures for some New Zealand species and Fleming (1984) provides a partial review of the New Zealand species. Phylogenetic relationships of the genus with other Cicadidae are provided by Moulds (2005a) in a cladistic analysis that includes a representative of the type species.

## Genus *KOBONGA* Distant

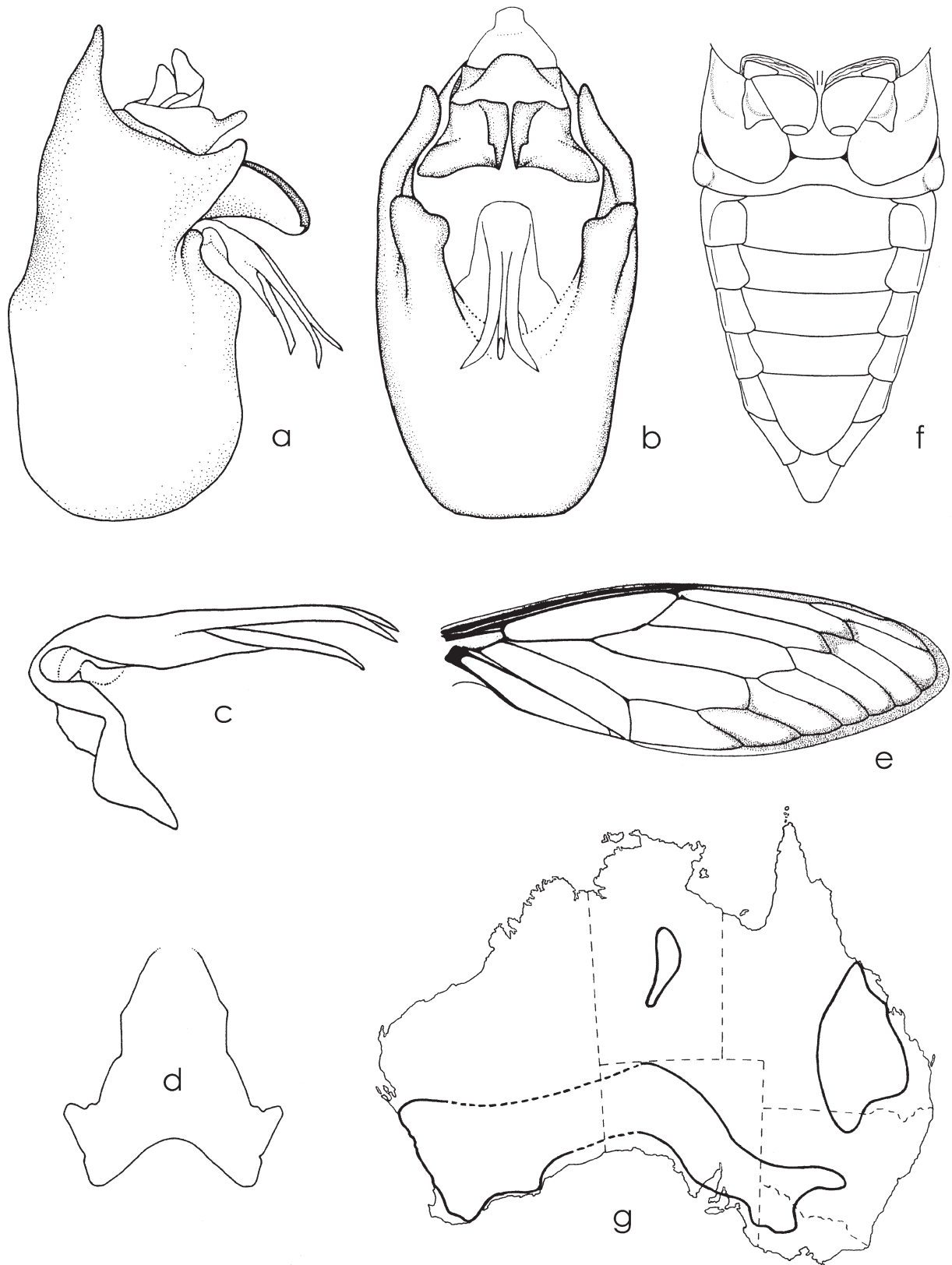
*Kobonga* Distant, 1906a: 387; Distant, 1906d: 163, 177; Ashton, 1912b: 27; Ashton, 1914a: 351; Schulze, Kükenthal and Heider, 1926–40: 1731; Kato, 1932: 187; Neave, 1939b: 831; Metcalf, 1944: 155; Metcalf, 1947: 163; Kato, 1956: 70, 79; Burns, 1957: 666; Metcalf, 1963: 271; Dugdale, 1972: 877, 878, 880; Duffels and van der Laan, 1985: 299; Moulds, 1990: 129; Moulds, 2005a: 390, 430, 436.

**Type species:** *Cicada umbrimargo* Walker, 1858, by original designation (Pl. 1, fig. 1).

**Included species:** AUSTRALIAN: *apicans* Moulds and Kopestonsky, 2001; *apicata* (Ashton, 1914), **comb. n.**; *froggatti* Distant, 1913; *fuscomarginata* (Distant, 1914); *godingi* (Distant, 1905); *oxleyi* (Distant, 1882); *umbrimargo* (Walker, 1858). OTHERS: none.

**Distribution** (Fig. 156g): Most of the southern third of Western Australia, through much of South Australia except the north-east quarter, north-western Victoria, south-western NSW, inland northern NSW extending north through much of central Queensland almost to Mackay, and in central Northern Territory (Moulds 1990, Moulds and Kopestonsky 2001, Haywood 2006a).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth (absent in some individuals); cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 156e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one (although some individuals of *K. umbrimargo* and *K. froggatti* have these veins just separated); vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; distance between cross veins and r-m much less than distance between r-m and m; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation overlaying veins at bases of apical cells 2 and 3, in some species also at bases of 5 and 7, also at extremities of longitudinal veins and usually also including ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells (5 in aberrant specimens); infuscation along much of ambient vein in some species; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 156f) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half. *Male abdomen* (Fig. 156f) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites III–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.



**FIGURE 156.** Genus *Kobonga* Distant: (a) *K. umbrimargo* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, fore wing; (f) the same, underside of male body showing opercula; (g) generic distribution.

*Male genitalia* (Figs 156a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, small to moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view with a subapical outward bump, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to medium-sized cicadas. The paranota have a mid lateral tooth, the fore wing ambient vein is continuously infuscated along much of its length in all described species except *apicata*, and the fore wing apical cells are much shorter than the ulnar cells in all species except *apicans*, *apicata* and *froggatti*.

The male genitalia have claspers that are essentially flat and wide in lateral view with an out-turned rim along upper margin to apex; the basal lobes are unique in having a subapical outward bump (not always clearly developed), and the aedeagus has a typically 'trifid' theca exposing a fleshy endotheca.

**Discussion.** Phylogenetic relationships of this genus are documented in a cladistic study by Moulds (2005a), in which the type species is represented, and in the introductory part of this paper. The distribution and biology of the species of this genus have been summarised by Moulds (1990, 2001) and Moulds & Kopestonsky (2001). Additional notes on *K. oxleyi* and *K. apicata*, including analyses of their songs, can be found in Ewart (1998a, 2009a) and Ewart & Popple (2001). Further notes on *Kobonga* species are provided by Coombs (1993a), Haywood (2006a) and Popple & Strange (2002).

## Genus *LEMBEJA* Distant

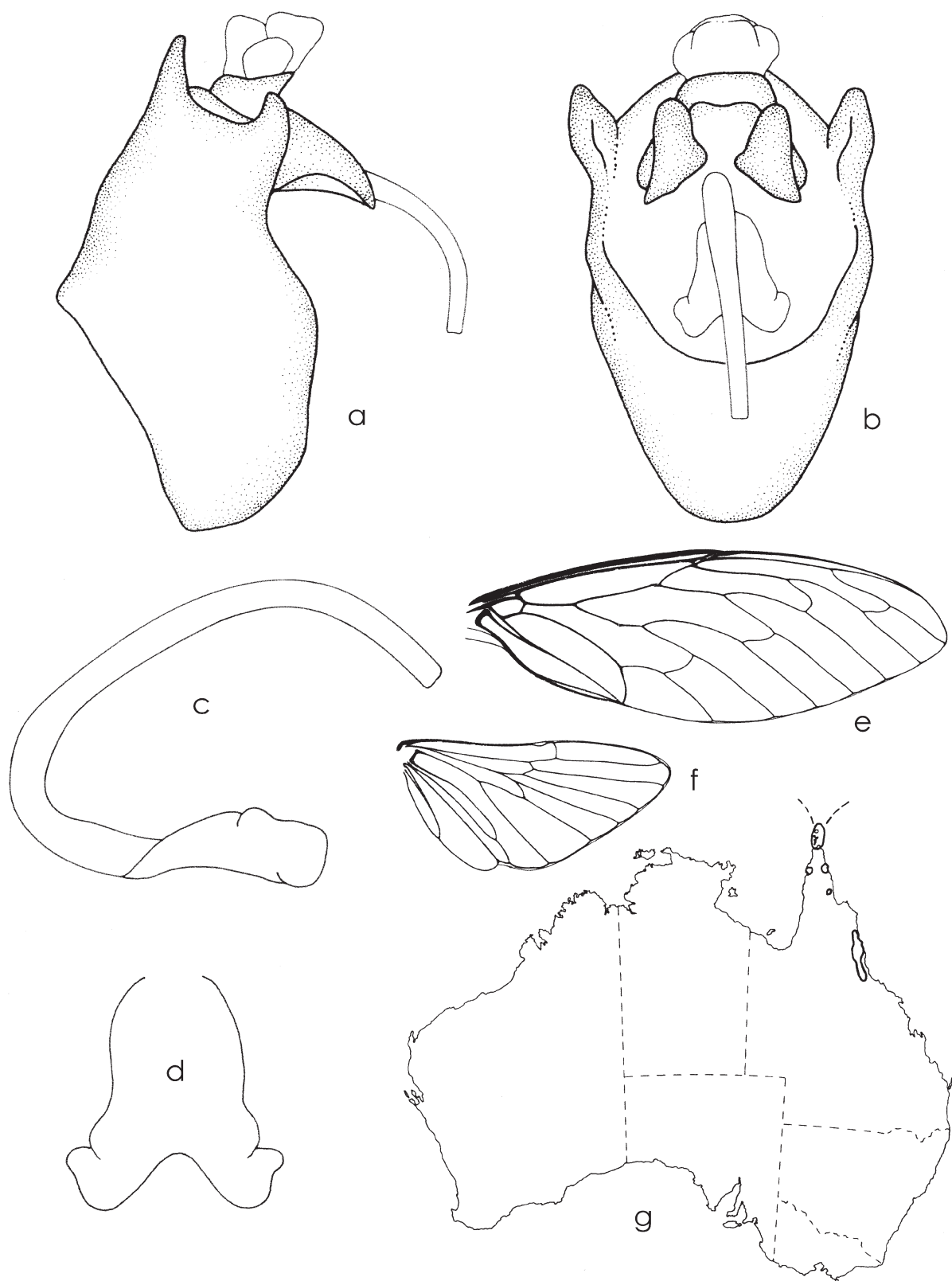
*Perissoneura* Distant, 1883: 189 (nec *Perissoneura* MacLachlan, 1891); Karsch, 1890b: 190; MacLachlan, 1891: 319, 320; Schulze, Kükenthal and Heider, 1926–40: 2589; Neave, 1940a: 668; Metcalf, 1944: 156.

*Lembeja* Distant 1892: 103 (replacement name for *Perissoneura* Distant, 1883); Distant 1892: 147; Distant 1897: 370; Jacobi 1903: 10, 13; Distant 1905g: 276, 279; Kuhlitz 1905: 79; Distant 1906d: 182, 184; Distant 1909: 394; Ashton 1912d: 77; Horváth 1912b: 609; Horváth 1913: 427; Ashton 1914a: 356; Distant 1914b: 346; Delétang 1923: 623; Handlirsch 1925: 1116; Schmidt 1925: 42; Schulze, Kükenthal and Heider 1926–40: 1791; Myers 1929b: 50; Kato 1932: 188, 189; Neave, 1939b: 892; Jacobi, 1941: 317, 318; Metcalf, 1944: 155; Lallemant and Synave, 1953: 233; Kato 1956: 23, 70; Burns 1957: 669; Metcalf, 1963: 428; Duffels 1977: 205, 207; Boulard 1979a: 46; Holloway 1979: 235; de Jong and Duffels, 1981: 53; de Jong, 1982: 175; Duffels, 1983b: 492; de Jong, 1985: 165, 166; Duffels and van der Laan 1985: 314; de Jong, 1986: 141–180; Duffels, 1986: 319, 325, 326; Moulds 1990: 178; Duffels, 1990: 68, 69; Duffels and de Boer, 1990: 257; de Boer, 1993b: 146; de Boer, 1995d: 200, 221, 222, 229, 234; de Boer and Duffels 1996a: 155, 167; de Boer and Duffels 1996b: 301; Moulds, 2005a: 393, 412, 413, 430, 436.

*Lembejam* [sic]; Breddin, 1901: 113 (misspelling).

**Type species:** *Perissoneura maculosa* Distant, 1883, by subsequent designation by Distant, 1905g: 279.

**Included species:** AUSTRALIAN: *paradoxa* (Karsch, 1890b); *vitticollis* (Ashton, 1912d). OTHERS: *brendelli* de Jong, 1986; *crassa* Distant, 1909; *dekkeri* de Jong, 1986; *distanti* de Jong, 1986; *elongata* de Jong, 1986; *fatiloqua* (Stål, 1870a); *foliata* (Walker, 1858b); *fruhstorferi* Distant, 1897; *harderi* Schmidt, 1925; *hollowayi* de



**FIGURE 157.** Genus *Lembeja* Ashton: (a) *L. maculosa* (Distant) (the type species of the genus, but not Australian), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution in Australia.

Jong, 1986; *incisa* de Jong, 1986; *maculosa* (Distant, 1883); *majuscula* de Jong, 1986; *minahassae* de Jong, 1986; *mirandae* de Jong, 1986; *oligorhanta* de Jong, 1986; *papuensis* Distant, 1897; *pectinulata* de Jong, 1986; *robusta* Distant, 1909; *roehli* Schmidt, 1925; *sangihensis* de Jong, 1986; *sanguinolenta* Distant, 1909; *tincta* (Distant, 1909).

**Distribution** (Fig. 157g): Philippine Islands (Mindanao), Sangihe Island, Sulawesi, Lesser Sunda Islands, New Guinea and Australia where it is confined to north-eastern Queensland from the Torres Strait Islands to the Paluma Range (de Jong 1986, Moulds 1990).

**Diagnosis.** *Head* including eyes narrow, considerably less than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome narrower than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 157e) maculated, tegmen-like, brown; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part, the fusion complete to ambient vein; infuscation absent but patchy maculation following veins on some species; wing outer margin greatly reduced and in part contiguous with ambient vein. *Hind wings* (Fig. 157f) with 6 apical cells; no infuscation on ambient vein; veins CuP and 1A fused as one in most species before ambient vein; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VI in cross-section convex. *Timbal* covers absent; timbal ribs many and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 157a–d). Pygofer with distal shoulders not developed; upper lobes thickened, well developed; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominating, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view T-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Medium-sized cicadas, brown in colour with fore wings that resemble dead leaves. Clearly distinguished from all other Australian genera by the fusion of hind wing veins CuP and 1A prior to reaching ambient vein. Fore wing veins CuP and 1A are also characteristically fused right to the ambient vein instead of diverging just prior to meeting the ambient vein and the fore wing outer margin is greatly reduced and in part contiguous with the ambient vein. *Lembeja* is also the only Australian genus in which the fore wings have the appearance of dead leaves, being opaque and brown in colour.

**Discussion.** Phylogenetic relationships of this genus are documented by Moulds (2005a) in a cladistic analysis that incorporates *L. vitticollis* as the single representative of *Lembeja*. The Australian species have been reviewed by de Jong (1982) and Moulds (1990). De Jong (1987) placed *paradoxa* in the *fatiloqua* group characterised by a strongly developed medial dent in the first tergite of males and an inflatable telescoping male abdomen, and placed *vitticollis* in the *robusta* group which awaits revision and description (de Jong pers. comm., and de Boer 1995b).

### Genus *LIMNOPSALTA* gen. n.

**Type species:** *Melampsalta stradbokensis* Distant, 1915.

**Included species:** AUSTRALIAN: *stradbokensis* (Distant, 1915), **comb. n.** OTHERS: none.



**Etymology.** From the Greek *limno* meaning marsh, lake or pool and referring to the type species' preferred habitat of sedge swamps and reed grass, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

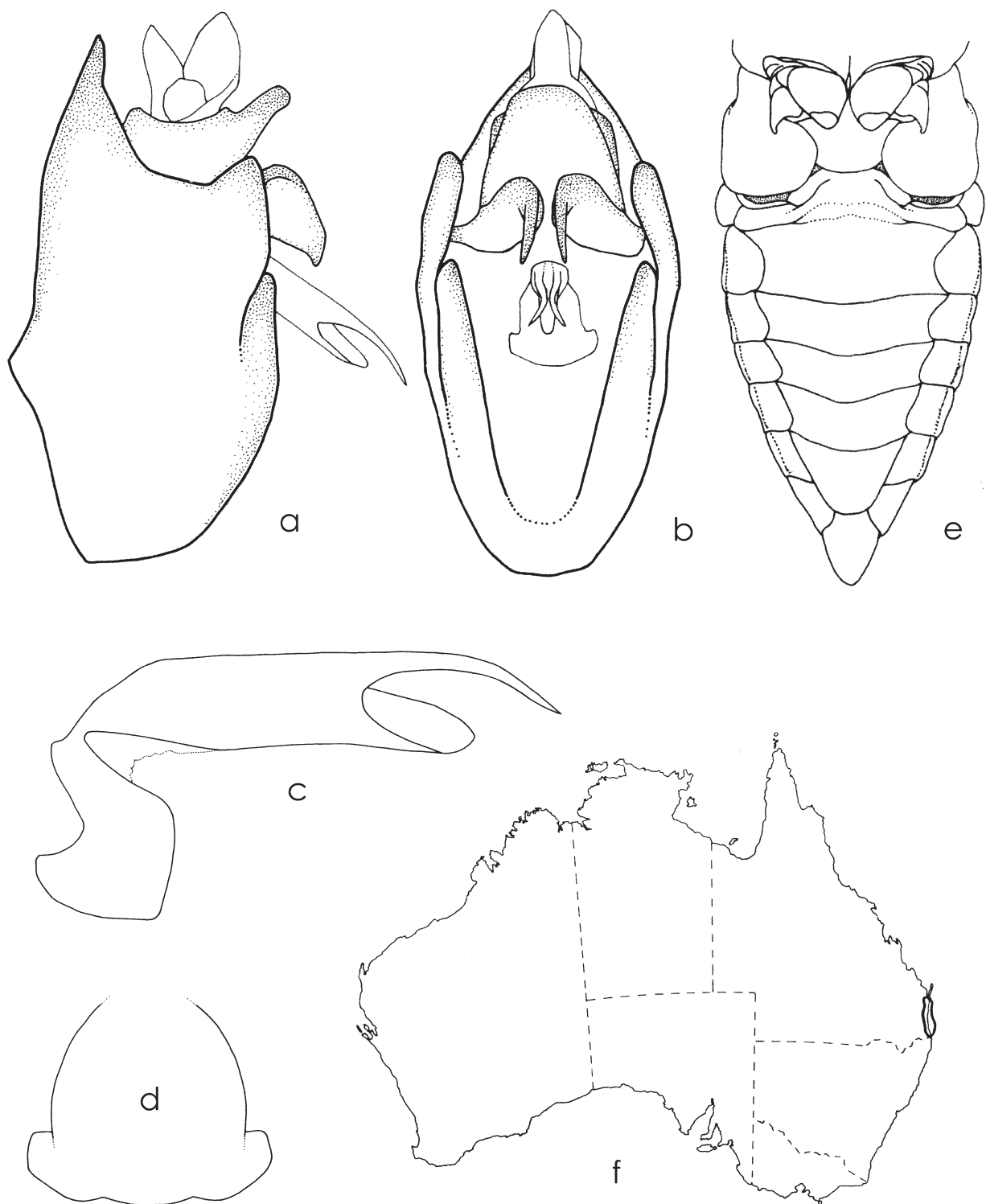
**Distribution** (Fig. 158f): South-eastern Queensland in coastal districts from Fraser Island to near Burleigh Heads.

**Diagnosis.** *Head* including eyes a little narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell usually very long (about equal to or longer than distance from its apex to wing tip), occasionally shorter; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 158e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* (Fig. 158e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 158a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, tubular, tapering to a hooked beak-like distal end; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; almost parallel in ventral view but slightly diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. Male reproductive system unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the fore wing radial cell is very long (about equal to or longer than the distance from its apex to wing tip), and the paranota are confluent with adjoining sclerites and lack a mid lateral tooth.



**FIGURE 158.** Genus *Limnopsalta* **gen. n.:** (a) *L. stradbokensis* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) underside of male abdomen showing opercula; (f) generic distribution.

These characteristics distinguish *Limnopsalta* from all genera except some rare individuals of *Telmapsalta* that have a long fore wing radial cell. *Limnopsalta* differs in the shape of the claspers of the male genitalia which are almost parallel in ventral view, tubular, and in lateral view taper to a hooked beak-like apex; those of *Telmapsalta* are strongly divergent in ventral view while in lateral view are apically broadly rounded.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis included in the introductory part of this paper. Ewart (1989a) briefly mentions wing clapping in *L. stradbokensis*. Further notes on *L. stradbokensis* are provided by Ewart (1995) and Moulds (1990).

### Genus *MACROTRISTRIA* Stål

*Cicada* (*Macrotristria*) Stål 1870b: 714.

*Macrotristia* [sic]; Atkinson 1886: 178 (stat. nov., misspelling); Distant 1891: 93.

*Macrotristria*; Kirby 1896: 458; Distant 1904b: 329; Distant 1904c: 425; Distant 1906d: 30, 31; Froggatt 1907: 350; Ashton 1912c: 30; Distant 1912a: 25; Ashton 1914a: 347; Ashton 1914b: 12; Ashton 1921: 99; Tillyard 1926: 162; Schulze, Kükenthal and Heider 1926–40: 1949; Myers 1929b: 135; Kato 1932: 9, 141, 154; Neave 1940a: 23; Metcalf 1944: 154; Metcalf 1947: 163; Kato 1956: 62, 67; Burns 1957: 621; Metcalf 1963: 160; Burns 1964: 77–123; Duffels and van der Laan 1985: 55; Moulds 1990: 86–87; Moulds 1992: 133; Boulard 1996: 96, 100; Moulds, 2005a: 387, 388, 391, 423, 429–431.

*Cicada* (*Macrotristria*) [sic]; Horváth 1926: 96 (misspelling).

**Type species:** *Cicada angularis* Germar, 1834, by original designation.

**Included species:** AUSTRALIAN: *angularis* (Germar, 1834); *bindalia* Burns, 1964; *doddi* Ashton, 1912; *dorsalis* Ashton, 1912; *douglasi* Burns, 1964; *extrema* (Distant, 1892); *frenchi* (Distant, 1892); *godingi* Distant, 1907; *hieroglyphicalis* (Kirkaldy, 1909); *intersecta* (Walker, 1850); *kabikabia* Burns, 1964; *kulungura* Burns, 1964; *lachlani* Moulds, 1992; *maculicollis* Ashton, 1914; *sylvara* (Distant, 1901); *thophoides* Ashton, 1914; *vittata* Moulds, 1992; *worora* Burns, 1964. OTHERS: *madegassa* Boulard, 1996.

**Excluded species:** The following species do not belong to this genus.

*aterrima* (Distant, 1914) transferred to *Burbunga*, q.v.

*hillieri* Distant, 1907 transferred to *Burbunga*, q.v.

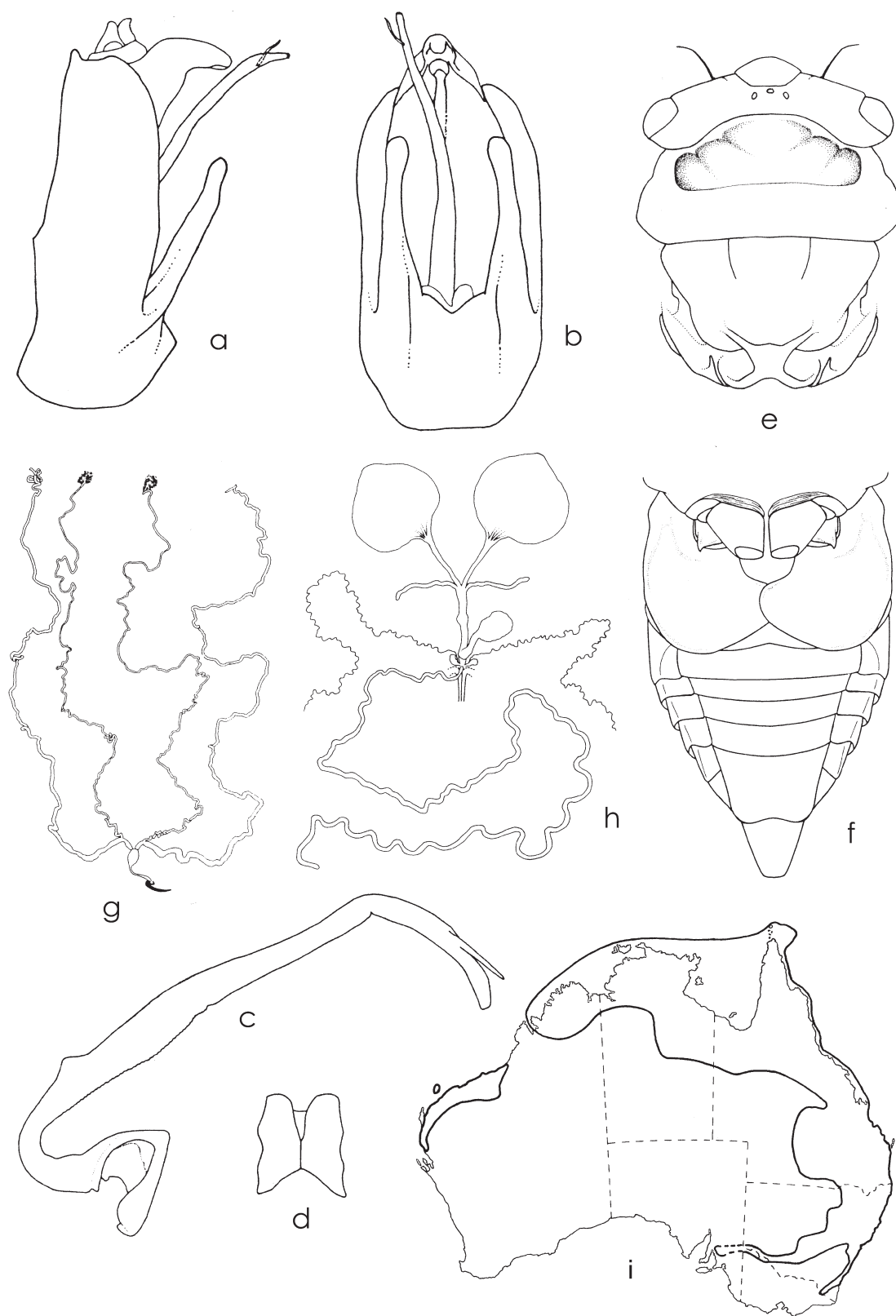
*nanda* Burns, 1964 transferred to *Burbunga*, q.v.

*nigrosignata* Distant, 1904 transferred to *Burbunga*, q.v.

*occidentalis* Distant, 1912 transferred to *Burbunga*, q.v.

**Distribution** (Fig. 159i): Throughout much of tropical and subtropical Australia and monsoonal offshore islands but absent from central Australia, much of Western Australia, the southern rim of the continent and Tasmania (Moulds 1990). A single species is also known from Madagascar (Boulard 1996).

**Diagnosis.** *Head* (Fig. 159e) including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 159e): pronotal collar width at dorsal midline broad, equal to about diameter of eyes or a little greater; paranota almost confluent with adjoining pronotal sclerites but with distinct anterior rounded lobe (except in *M. hillieri*), no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation on some species only, overlaying some or all veins at bases of apical cells 2–7, also sometimes at extremities of longitudinal veins near ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 159f) covering rim of distal margin of tympanal cavity, reaching a little beyond level of distal margin of tergite 2, overlapping. *Male abdomen* (Fig. 159f) in cross-section with sides of tergites



**FIGURE 159.** Genus *Macrotristria* Stål: (a) *M. angularis* (Germar), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and pronotum, dorsal view; (f) underside of male abdomen showing opercula; (g) *M. sylvara* (Distant), male reproductive system, dissection with aedeagus removed from pygofer; (h) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (i) generic distribution in Australia.

straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbals* flat, fully rounded dorsally and extending to metathorax, not tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases; timbal covers present.

**Male genitalia** (Figs 159a–d). Pygofer with distal shoulders broad, rounded, in some species the most distal part of pygofer; upper lobes absent; basal lobes undivided, moderately to strongly developed, tending to be broadly rounded or elongate in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe finger-like, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci present, either one or two; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system (Fig. 159g) with accessory glands long.

**Female reproductive system** (Fig. 159h) ditrysian; accessory glands of common oviduct long, longer than length of lateral oviduct.

**Distinguishing characters.** Medium to large cicadas. The broad pronotal collar (nearly equal to diameter of eyes, or a little more) with lateral margins greatly reduced is unique to *Macrotristria*. Also characteristic is a distinct rounded lobe to the anterior lateral margin of the pronotal collar. The male opercula closely follow the rim of the tympanal cavity and the timbal covers never tightly close off the timbal cavity.

The male genitalia lack unique characters; the theca has either one or two subapical cerci; the pygofer basal lobes, while moderately developed in most species, are very elongate in *M. angularis* and the uncus, although finger-like, shows much variety in form between species.

**Discussion.** Phylogenetic relationships of this genus are documented in Moulds (2005a) in a cladistic analysis that includes a representative of the type species and *M. intersecta*. Burns (1964) and Moulds (1990) have reviewed the genus. Additional notes on species including song analyses can be found in Bennet-Clark and Young (1992), Ewart (1993, 1995, 2005b), Ewart and Popple (2001) and Moulds (1992). Further notes on *M. angularis* are provided by Coombs (1996), Emery *et al.* (2005) and Popple & Strange (2002).

## Genus *MARTEENA* Moulds

*Marteena* Moulds, 1986: 39–40; Moulds, 1990: 126; Moulds, 2005a: 377, 393, 423, 425, 430, 436.

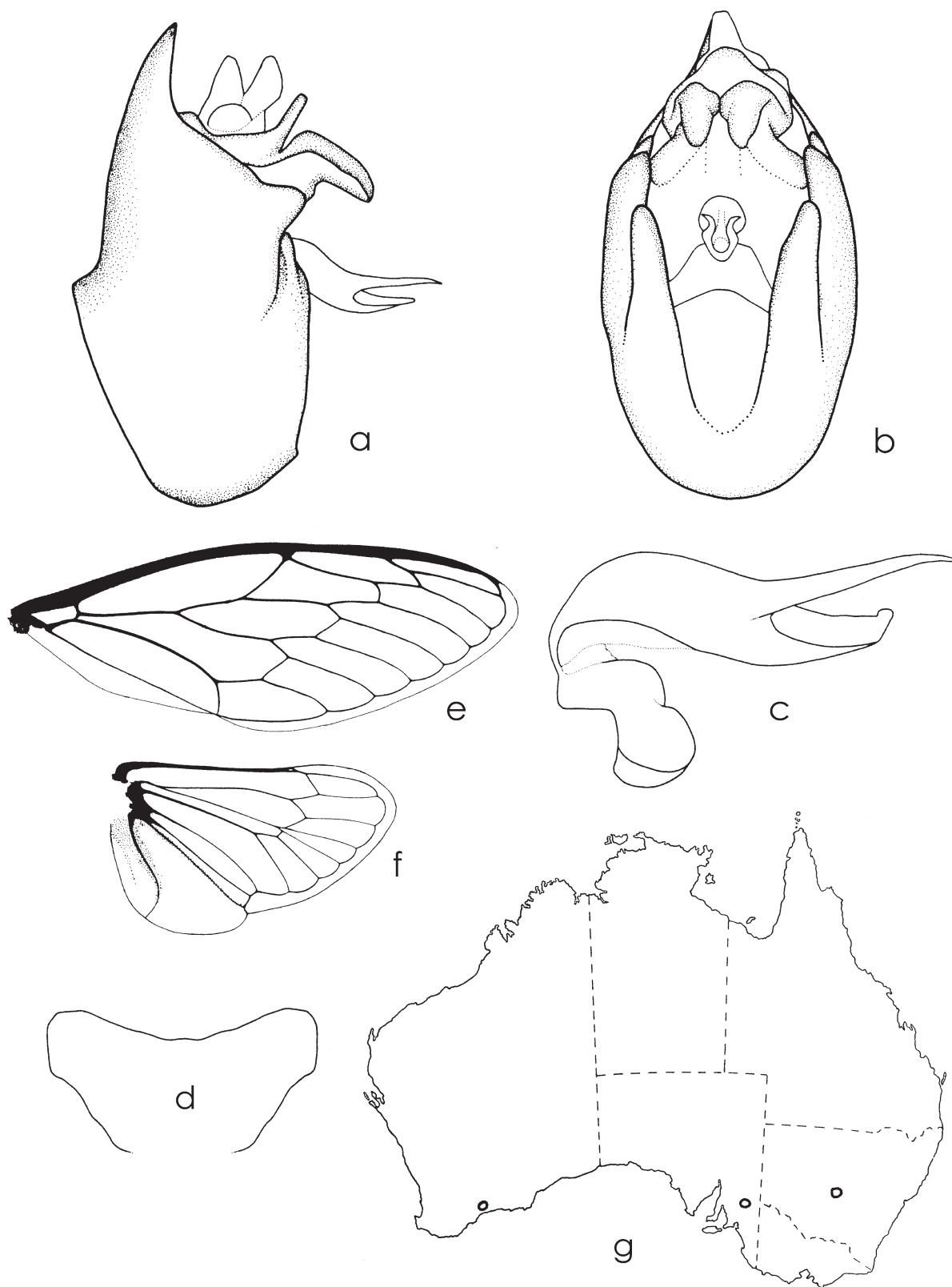
**Type species:** *Tibicen rubricinctus* Goding and Froggatt, 1904, by original designation.

**Included species:** AUSTRALIAN: *rubricincta* (Goding and Froggatt, 1904). OTHERS: none.

**Distribution** (Fig. 160g): Known only from Ravensthorpe in the south-west of Western Australia, near Morgan in the south-east of South Australia and near Eurabalong in mid western NSW (Moulds 1986, 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 160e) hyaline, without infuscation; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA strongly bowed so that cubital cell much larger than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 160f) with 6 apical cells; no infuscation on ambient vein; width of 1st





**FIGURE 160.** Genus *Marteena* Moulds: (a) *M. rubricincta* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution.

cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin, steeply outcurved and meeting ambient vein almost at right angles; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so; base (remnant of epimeron 3) much swollen and bubble-like; *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites III–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; large basal dome; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 160a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, fang-like, excavated ventrally; unfused; with a rounded, inward-facing swelling on inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view short and broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view directed upwards compared to thecal shaft with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal apex entirely chitinated, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. Male reproductive system unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Fore wing veins M and CuA are completely separated and parallel for a short distance before meeting the basal cell, hind wing vein 3A is steeply out-curved to meet the ambient vein almost at right angles, and the male opercula have the basal part (epimeron 3) swollen, somewhat like a low bubble. The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, the pseudoparameres are directed upward compared to the thecal shaft, and the claspers are fang-like with ventral excavations plus a rounded, inward-facing swelling around mid length on inner margin.

**Discussion.** The phylogenetic relationships of this monotypic genus have been documented in the cladistic study of Moulds (2005a) and in the introductory part of this paper. The single species of this genus has been reviewed by Moulds (1986, 1990).

### Genus *MELAMPSALTA* Kolenati, 1857

**Type species:** *Cicadetta* (*Melampsalta*) *musiva* var. *caspica* Kolenati, 1847, by monotypy.

Boulard (1988, 1998) and Moulds (1988) provide detailed discussion on the status, authorship, date and type species of *Melampsalta*. They concluded that the authorship and date of publication originates from Amyot (1847). However, subsequently the International Commission on Zoological Nomenclature suppressed Amyot's 1847 work (Opinion 2165) making the names in it unavailable for nomenclatorial purposes. The name *Melampsalta* now dates from Kolenati (1857).

No Australian species has been placed in *Melampsalta* since Moulds (1990). Many species of Australian Cicadettini were either originally described in *Melampsalta* or transferred there by Stål (1863b) from *Cicadetta*. Since

that time many have interchanged several times between *Melampsalta*, *Cicadetta* and *Pauropsalta*. The first catalogue of Australian cicadas (Burns 1957) lists 83 species in *Melampsalta*, including all species previously placed in *Pauropsalta* believing the latter synonymous with *Melampsalta*. However, six years later Metcalf (1963), in his world catalogue, chose *Cicadetta* to hold these Australian species except for those originally described in *Pauropsalta* which Metcalf correctly returned to that genus. Subsequently, several authors working on non-Australian cicadas showed that *Melampsalta* and *Cicadetta* are in fact not synonymous and should be treated as legitimate separate genera. Consequently, Duffels and van der Laan (1985) in their world catalogue, returned all those Australian species listed in *Cicadetta* by Metcalf back to *Melampsalta*, the genus in which they were originally described. Moulds (1988, 1990) evaluated the status of all Australian species then in *Melampsalta* and Moulds (1990) returned the remaining *Melampsalta* species to *Cicadetta* as they were all closer to *Cicadetta* than to *Melampsalta*, ending up with a total of 55 species in *Cicadetta*. See 'Genus *Cicadetta*' in this review for further details.

### Genus *MUGADINA* gen. n.

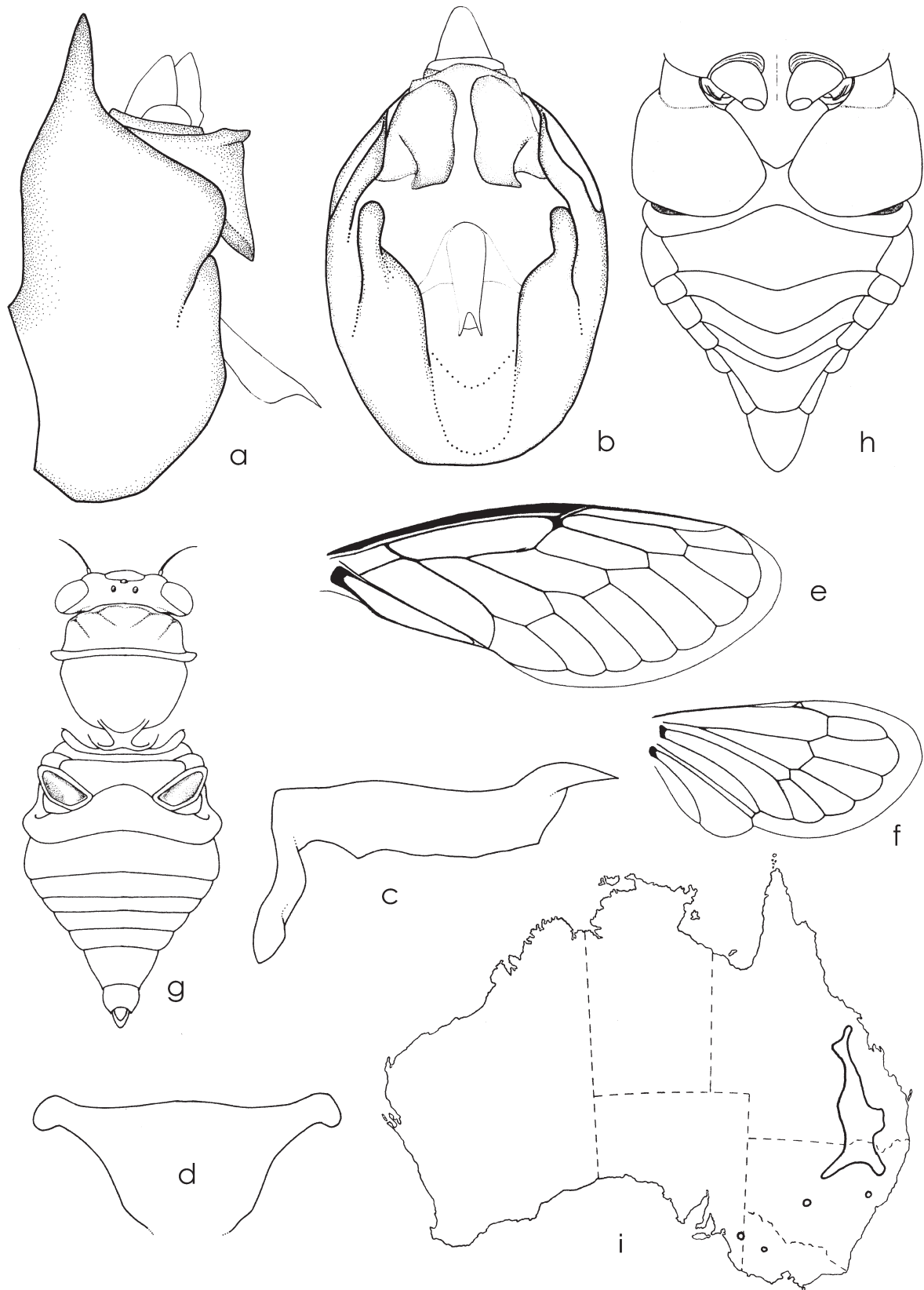
**Type species:** *Urabunana marshalli* Distant, 1911.

**Included species:** AUSTRALIAN: *emma* (Goding & Froggatt, 1904), **comb. n.**; *festiva* (Distant, 1907), **comb. n.**; *marshalli* (Distant, 1911), **comb. n.** OTHERS: none.

**Etymology.** An arbitrary combination of letters. Feminine.

**Distribution** (Fig. 161i): Inland central and southern Queensland, inland north-eastern New South Wales, near Armidale on the New England Tablelands of New South Wales, near Griffith in the central west of New South Wales, Kewell in western Victoria and near Wolseley in South Australia (Coombs 1993a, 1995; Moulds 1990; Haywood 2006a).

**Diagnosis.** *Head* (Fig. 161g) including eyes about as wide or narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 161g): pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum; metanotum partly visible at dorsal midline. *Fore wings* (Fig. 161e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node (but sometimes slightly thickened before node), costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused for much of their length; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation often absent, in some species overlaying veins at bases of apical cells 2 and 3, and sometimes extending along distal ends of veins forming apical cells and onto wing margins; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 161f) with 4 or 5 apical cells (sometimes 3 or 6 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe narrow with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 161h) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Figs 161g, h) bulbous, broadest a little anterior of mid length, very much wider than thorax (approximately 1.4x wider); tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as long or longer than tergite 3 along dorsal midline; sternites III–VII in cross-section convex, unusually swollen so that each is partly visible in lateral profile. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.



**FIGURE 161.** Genus *Mugadina* gen.n.: (a) *M. marshalli* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) the same, male head and body, dorsal view; (h) the same, underside of male body showing opercula; (i) generic distribution.

*Male genitalia* (Figs 161a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, small to moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, claw-like with minimal cavity ventrally; spaced apart; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends with their apices widely separated and approaching the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view short and broad, apically broadened with 'ears' and far broader than long; basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate, junction between theca and basal plate with a functional 'hinge' that is small, and substantially compressed between theca and basal plate; thecal shaft nearly straight, parallel-sided, thick-set; pseudoparameres present, arising subapically, lateral of theca, fused for part of their length, in dorsal view wide apart, diverging throughout their length, in lateral view directed upwards compared to thecal shaft; endotheca concealed; ventral support absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. Male reproductive system unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Very small to small cicadas. Differs from all other Australian genera in having a combination of fore wing veins M and CuA meeting the basal cell completely fused as one, hind wings with 4 or 5 apical cells (sometimes 3 or 6 if aberrant but usually so only in one wing), the fore wing apical cells similar in length to the ulnar cells and a male abdomen that is markedly swollen, bulbous, much wider than the thorax (about 1.4x wider) with its widest point a little anterior of mid length. *Mugadina* is most similar to *Paradina* and *Graminitigrina* from which it differs significantly in the male genitalia; the pseudoparameres are very short and arise subapically while those of *Paradina* and *Graminitigrina* are long and arise towards the base of the theca.

The male genitalia have an aedeagus with the pseudoparameres fused for half their length or more. Further, the claspers have their *apices* very wide apart but not as wide as the widest dimensions of the claspers, the aedeagus is thick-set, nearly straight and parallel-sided, the pseudoparameres are very short, broad, arise subapically and extend distal of the gonopore, and the endotheca is concealed.

*Mugadina* is also superficially similar to *Dipsopsalta*, *Pipilopsalta* and *Uradolichos* because of the swollen male abdomen; it differs from *Dipsopsalta* in *not* having short apical cells, from *Pipilopsalta* and *Uradolichos* in having the width of head including eyes about as wide or wider than lateral angles of pronotal collar instead of much narrower.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution and biology of the species included in this genus are provided by Moulds (1990) and Haywood (2006a). Further notes on *M. marshalli* can be found in Ewart (1998a), Coombs (1995, 1996) and Popple & Strange (2002). Notes on *M. festiva*, including a song analysis, are provided by Coombs (1993a).

### Genus *MYOPSALTA* gen. n.

**Type species:** *Melampsalta crucifera* Ashton, 1912.

**Included species:** AUSTRALIAN: *atrata* (Goding and Froggatt, 1904), **comb. n.**; *binotata* (Goding and Froggatt, 1904), **comb. n.**; *crucifera* (Ashton, 1912), **comb. n.**; *lactea* (Distant, 1905), **comb. n.**; *mackinlayi* (Distant, 1882), **comb. n.**; *waterhousei* (Distant, 1905), **comb. n.**; *wollomombii* (Coombs, 1995), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *myo* meaning close or shut, and referring to the opercula that close off the tympanal cavity, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 162f): Much of the eastern half of Queensland south from Laura, through the eastern half of New South Wales but excluding most higher altitudes and most coastal districts, through much of Victoria to South Australia as far west as the Eyre Peninsula.



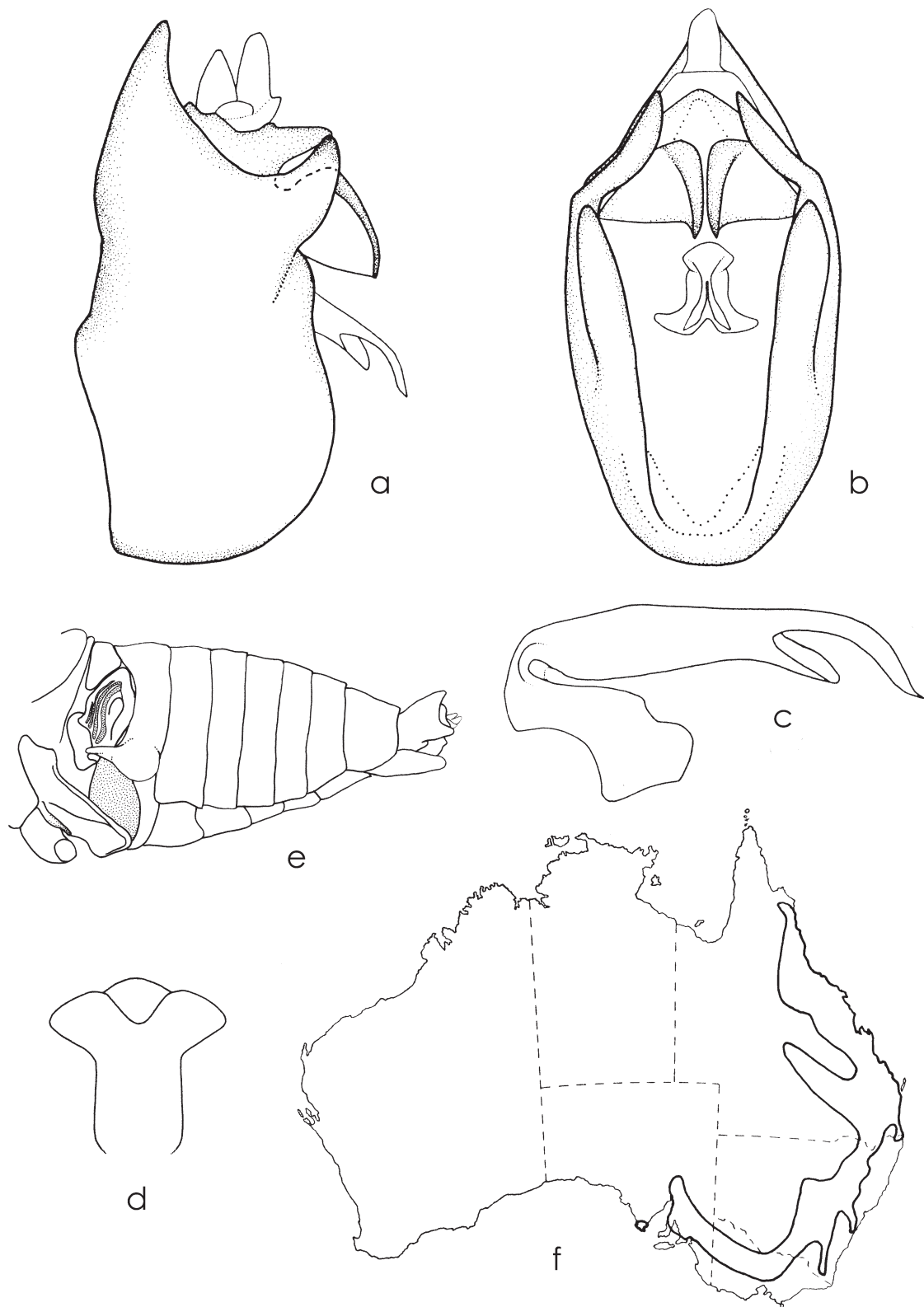
**Diagnosis.** *Head* including eyes about as wide as or a little wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth except in *crucifera* and *wollomombii* where it is sometimes present; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation either absent or overlaying most veins, absent from crossvein m-cu, veins M<sub>4</sub> and CuA<sub>1</sub> and ambient vein (except in *lactea* and *waterhousei*); wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* (Fig. 162e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, sternites greatly swollen so that each is visible in lateral profile. *Timbals* with 3 long ribs spanning the full height of the timbal (and 1 or 2 not so long, and spaced with intermediate short ribs; basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 162a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. Male reproductive system unknown.

*Female dorsal beak* absent. *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from all other genera by having the combination of fore wing veins M and CuA meeting the basal cell with their stems completely fused as one, the paranota confluent with adjoining pronotal sclerites and lacking a mid lateral tooth (except some specimens of *crucifera* and *wollomombii* that have a mid lateral tooth), male abdominal tergite 2 broad along the dorsal midline (much wider than tergite 3), and the male sternites greatly swollen so that all are usually visible in lateral profile.

The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, and claspers that are essentially flat and wide in lateral view and distally parallel in ventral view.



**FIGURE 162.** Genus *Myopsalta* **gen. n.:** (a) *M. crucifera* (Ashton), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, male abdomen, lateral view; (f) generic distribution.

Some species appear very similar to the New Zealand genus *Notopsalta* but that genus has an ampliate paranotum that bears a mid lateral tooth (see also distinguishing characters under 'Genus *Notopsalta*' in this review).

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. The songs of *Myopsalta* species (as *Notopsalta*) have been analysed by Ewart (1998a). Notes on the distribution, habitat and biology of *M. atrata*, *M. crucifera* and *M. waterhousei* are provided by Moulds (1990). Further notes on *Myopsalta* species are provided by Coombs (1995, 1996), Emery *et al.* (2005) and Popple & Strange (2002). Notes on some undescribed species from Queensland, including song analyses, are provided by Ewart (1988, 1998a, 1998b, 2009a), Ewart & Popple (2001) and Popple & Strange (2002).

### Genus *NANOPSALTA* gen. n.

**Type species:** *Pauropsalta basalis* Goding and Froggatt, 1904.

**Included species:** AUSTRALIAN: *basalis* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

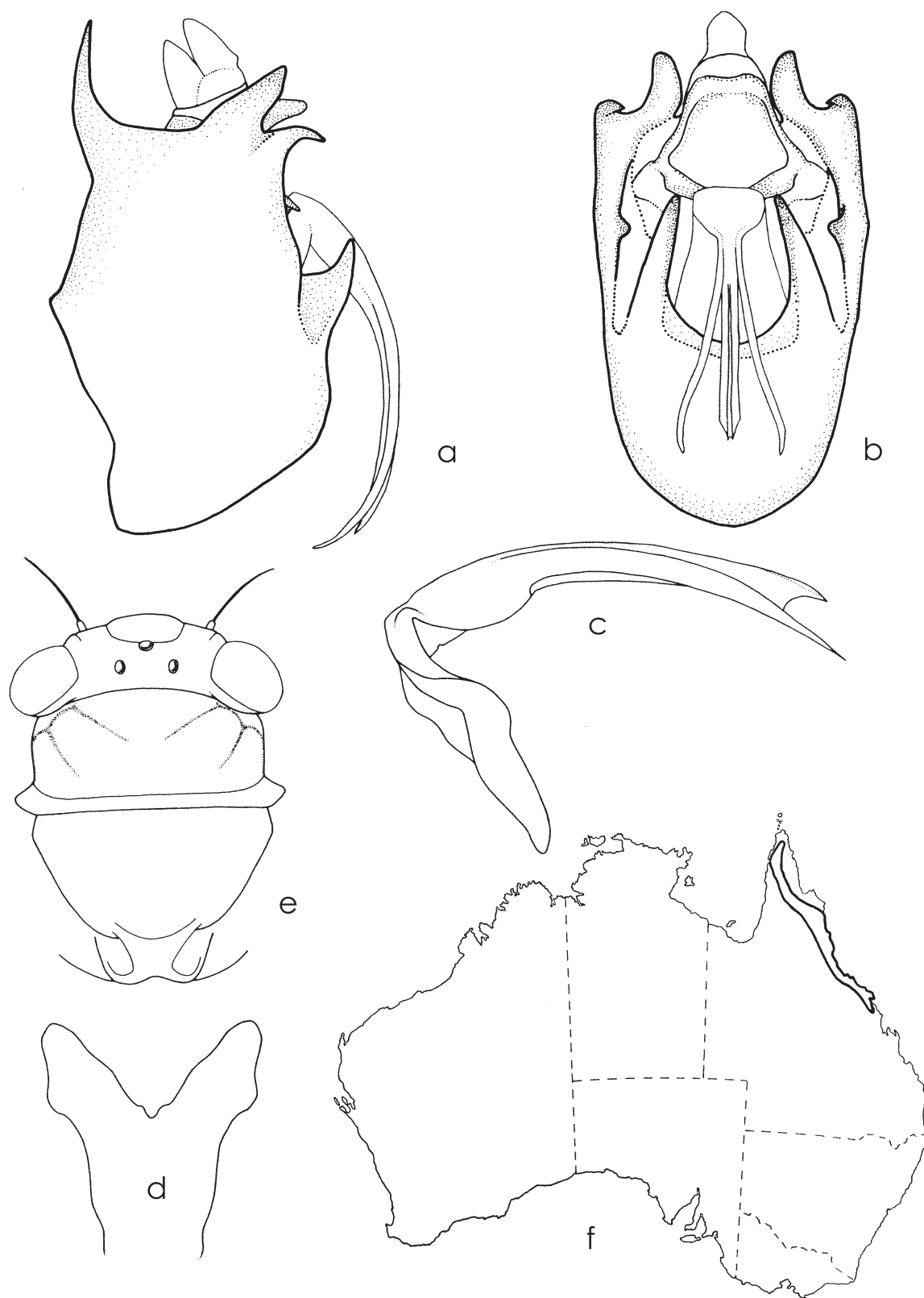
**Distribution** (Fig. 163f): Northern Queensland from Heathlands Station in the far north of Cape York Peninsula to Mackay, both coastal and inland (Ewart 1993, Moulds 1990).

**Etymology.** From the Latin *nanus* meaning dwarf or little and referring to the size of the type species, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Diagnosis.** *Head* (Fig. 163e) including eyes wide, clearly wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax* (Fig. 163e): pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 5 apical cells (sometimes 6 or 4 if aberrant, but usually only in one wing); no infuscation on ambient vein except at distal end of vein 2A; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 163a–d). Pygofer with distal shoulders not developed; upper lobes flat, moderately developed with accessory 'tooth'; basal lobes undivided, large, in lateral view projecting outwards, basically triangular; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view Y-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge', small, substantially compressed between theca and basal plate in lateral view; thecal shaft straight or curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; endotheca exposed, ridged, in part or entirely chitinized; endothecal ventral support absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.



**FIGURE 163.** Genus *Nanopsalta* gen.n.: (a) *N. basalis* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and pronotum, dorsal view; (f) generic distribution.

**Distinguishing characters.** Very small cicadas. The head is clearly wider than the mesonotum, there are usually 5 apical cells on the hind wing (sometimes 6 or 4 if aberrant, but usually so only in one wing) and there is an infuscation on the hind wing at the distal end of vein 2A.

The type species was previously considered to belong to *Pauropsalta*. *Nanopsalta* differs from *Pauropsalta* in the male genitalia; the upper pygofer lobes are not excessively large, long and flat but are moderately developed and bifurcate, with the lower appendage tooth-like and sharply pointed, while the basal pygofer lobes are large, projecting, broad and nearly triangular in lateral view. The theca of *Nanopsalta* has a unique dorsal groove on the distal half.

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis of Moulds (2005a). Notes on the distribution and biology of the single species included in this genus have been provided by Moulds (1990). Further notes, including an analysis of the song of *N. basalis*, can be found in Ewart (1993).

### Genus *NEOPSALTODA* Distant

*Neopsaltoda* Distant, 1910: 415; Distant, 1912a: 22, 23; Ashton, 1921: 95; Schulze, Kükenthal and Heider, 1926–40: 2231; Kato, 1932: 153; Neave, 1940a: 306; Kato, 1956: 66, 79; Burns, 1957: 619; Metcalf, 1963: 155; Duffels and van der Laan, 1985: 54; Moulds, 1990: 72; Moulds, 2005a: 377, 387–391, 412, 413, 430, 431.

**Type species:** *Neopsaltoda crassa* Distant, 1910, by monotypy.

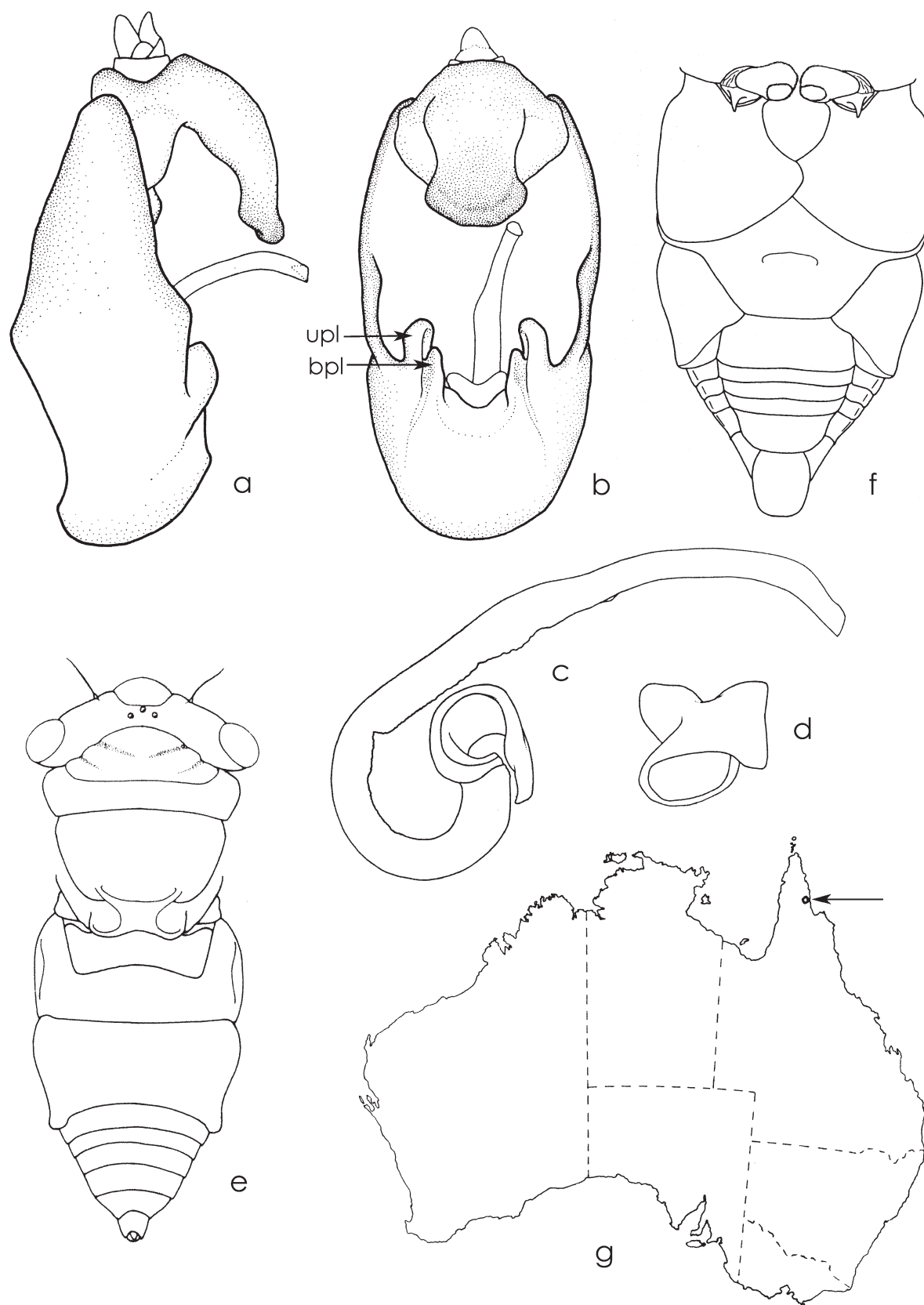
**Included species:** AUSTRALIAN: *crassa* Distant, 1910. OTHERS: none.

**Distribution** (Fig. 164g): Known only from the McIlwraith Range, Cape York Peninsula, Queensland (Moulds 1990).

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 164e): pronotal collar width at dorsal midline broad, equal to about diameter of eyes or a little greater; paranota strongly ampliate, evenly rounded, sloping forwards in lateral view; no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 164f) covering rim of distal margin of tympanal cavity, reaching to level of distal margin of tergite 2, overlapping, with very long and straight lateral margin. *Male abdomen* (Figs 164e, f) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 enlarged, accounting for over half abdominal length, tergite 3 extended ventrally, the two sides together covering half the width of the ventral surface; sternites IV–VII in cross-section flat except for upward tilted margin. *Timbals* flat, fully rounded dorsally and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases; timbal covers present.

*Male genitalia* (Figs 164a–d). Pygofer with distal shoulders broad, rounded, the most distal part of pygofer; upper lobes thickened, well developed; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe finger-like with broad apex, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through





**FIGURE 164.** Genus *Neopsaltoda* Distant: (a) *N. crassa* Distant, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsolateral view, apex at right; (e) the same, male head and body, dorsal view; (f) the same, underside of male body showing opercula; (g) generic distribution. *bpl* basal pygofer lobe, *upl* upper pygofer lobe.

180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Large cicadas. The exceedingly large male tergites 2 and 3, which together clearly occupy more than half the abdominal length, immediately distinguish males. Females cannot be distinguished from those of *Psaltoda*, *q.v.*

The male genitalia have a distinctive uncal lobe which, in dorsal view, is broad with an expanded, broad apex (Fig. 164b), plus restraint of the aedeagus by fleshy sinuation prior to the ventral surface of the uncus, characters shared only with *Psaltoda* and *Anapsaltoda*.

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis of Moulds (2005a). Notes on the distribution and biology of the single species included in this genus have been provided by Moulds (1990).

### Genus *NEOPUNIA* gen. n.

**Type species:** *Melampsalta graminis* Goding and Froggatt, 1904 (Pl. 2, fig. 6).

**Included species:** AUSTRALIAN: *graminis* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

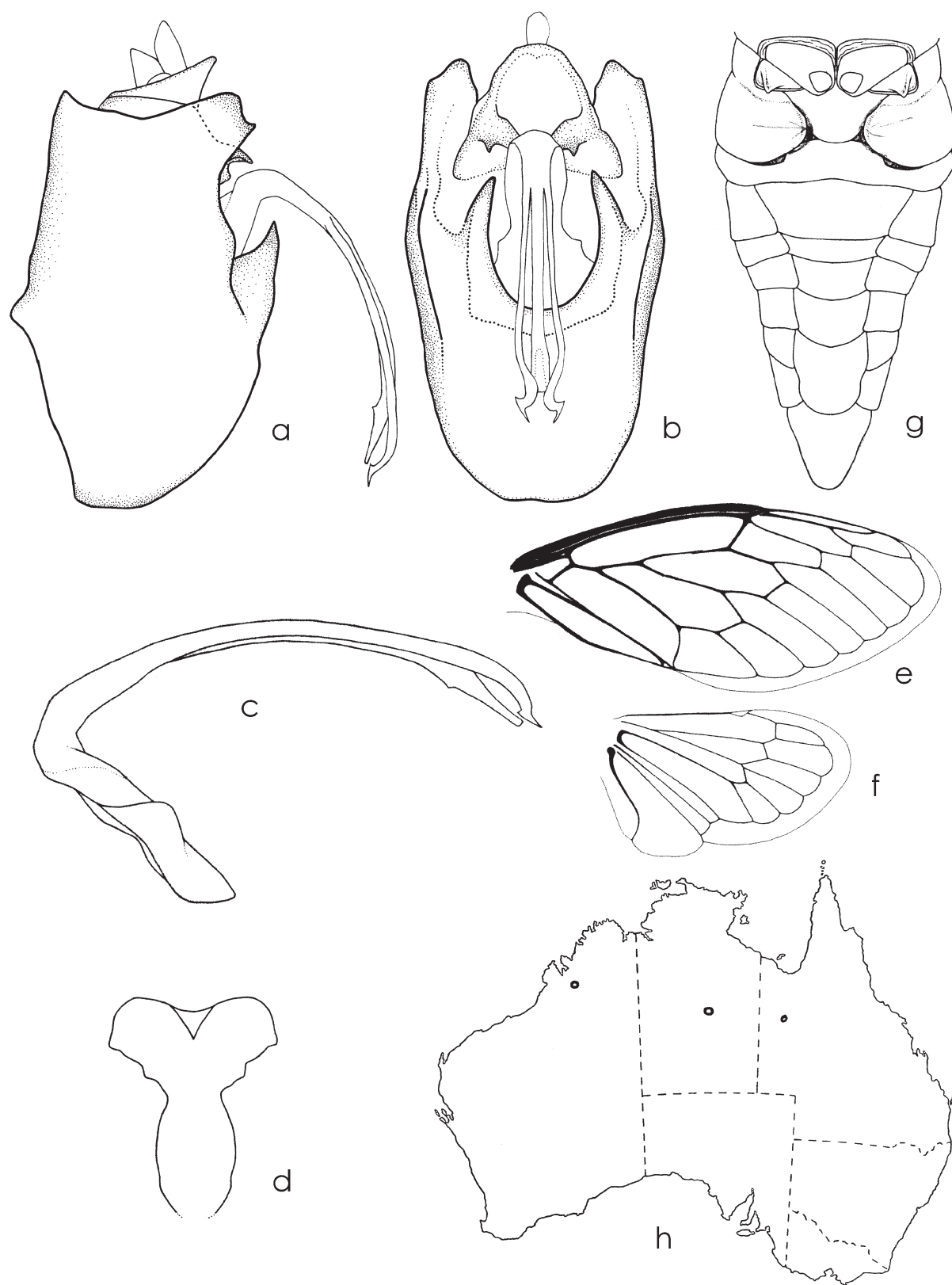
**Etymology.** From the Greek *neo* meaning new, and the generic name *Punia* to which it is closely allied; thus a new *Punia*-like genus. Feminine.

**Distribution** (Fig. 165h): Ashburton River in Western Australia, near Wauchope in Northern Territory and near Mount Isa in north-western Queensland.

The syntypes of *N. graminis*, the only species in this genus, are recorded as coming from South Australia. However, the Northern Territory was under the administration of South Australia when *graminis* was described and the syntypes may not have come from South Australia as we know it today. As all confirmed records are from the Northern Territory, the occurrence of the genus in South Australia requires confirmation.

**Diagnosis.** *Head* including eyes narrower or a little wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 165e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 165f) with 5 apical cells (sometimes 6 or 4 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 165g) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 165g) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 165a–d). Pygofer with distal shoulders not developed; upper lobes flat, moderately developed with accessory 'tooth'; basal lobes undivided, large, in lateral view projecting outwards, basically triangular; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view Y-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate



**FIGURE 165.** Genus *Neopunia* gen.n.: (a) *N. graminis* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) the same, underside of male abdomen showing opercula; (h) generic distribution.

with a functional 'hinge', small, substantially compressed between theca and basal plate in lateral view; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; endotheca exposed, ridged, in part or entirely chitinized; endothecal ventral support absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. The fore wing costa is clearly broadest a little before the node, the fore wing radial cell is very long being equal to or longer than distance from its apex to wing tip, there are 5 hind wing apical cells and there is no infuscation on the hind wing at the distal end of vein 2A. These characters distinguish *Neopunia* from all other genera except *Punia*. Males of *Neopunia* have no translucent tergites (Pl. 2, fig. 6). Females differ from *Punia* in having an abdomen nearly equal in length to the head plus thorax; in *Punia* the female abdomen is much longer.

The male genitalia have the upper pygofer lobes moderately developed and bifurcate, with the lower appendage tooth-like and sharply pointed, while the basal pygofer lobes are large, projecting, broad and nearly triangular in lateral view. The aedeagus possesses pseudoparameres that are very long, reaching to near the distal end of the theca, and the basal plate is Y shaped. In all of these characters the male genitalia are similar only to those of *Punia* and *Nanopsalta*.

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis of Moulds (2005a). It is closely allied to *Punia* and *Nanopsalta*.

### Genus *NOONGARA* gen. n.

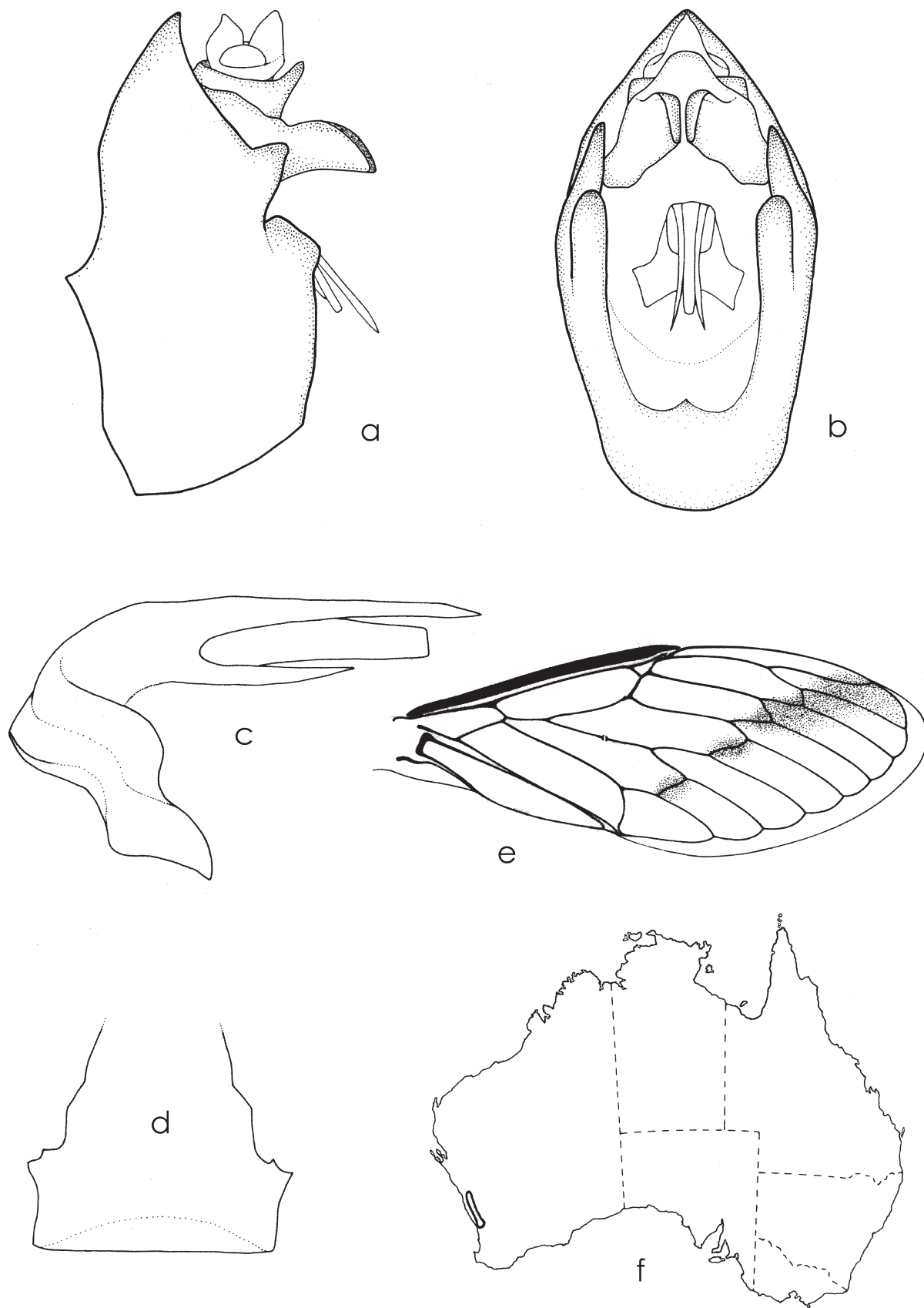
**Type species:** *Melampsalta issoides* Distant, 1905 (Pl. 2, fig. 10).

**Included species:** AUSTRALIA: *issoides* (Distant, 1905), **comb. n.** OTHERS: none.

**Etymology.** Derived from the name of the Aboriginal people that inhabited the broad south-west of Western Australia that incorporates the distribution of this genus. Feminine.

**Distribution** (Fig. 166f): Known only from the Perth region, south-western Western Australia. There are records from Koondoola and Mirrabooka (both suburbs of Perth) (M.R. Williams) and Cataby some 140 km north of Perth (M. Powell).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth, rounded; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 166e) hyaline; short, no longer than length of the body including head; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; costal vein (C) clearly higher than R+Sc; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA usually meeting basal cell with their stems completely fused as one but sometimes independently; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins and r-m variable, sometimes less and sometimes more than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell very short (about half the length of the distance from node to wing tip); infuscations prominent at bases of apical cells 2 and 3, and less so at bases of cells 5 and 7; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe of medium width with vein 3A curved, long, and separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 wide and swollen around dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section



**FIGURE 166.** Genus *Noongara* **gen. n.**: (a) *A. issoides* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, right fore wing; (f) generic distribution.



convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large with anterior part mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

**Male genitalia** (Figs 166a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus, lobe-like, flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view apically as long as or longer than broad, broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of their length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, no more than about half the length of pseudoparameres; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Differs from all other Australian genera in having the paranota confluent with adjoining pronotal sclerites and without a mid lateral tooth, a very short fore wing radial cell (about half the length of the distance from its apex to wing tip, fore wings that are distinctively infuscated (including infuscation on cross vein m-cu), and fore wings that are very short (no longer than the length of the body including the head) (Fig. 166e; Pl. 2, fig. 10). The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca and with pseudoparameres that are parallel for much of their length then diverging in dorsal view.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.

### Genus *NOTOPSALTA* Dugdale

**Type species:** *Cicada sericea* Walker, 1850, by original designation.

**Included species:** AUSTRALIAN: none. OTHERS: *sericea* (Walker, 1850).

**Excluded species:** *atrata* (Goding and Froggatt, 1904), to *Myopsalta* gen. n., q.v.

**Distribution.** Confined to New Zealand.

**Distinguishing characters.** Small cicadas. Distinguished from all other Cicadettini in having the following combination of characters: ampliate paranotum (lateral margin of pronotal collar) with a small tooth at about mid length, fore wing with distance between cross veins r and r-m (at distal ends of ulnar cells 1 and 2) about equal to or greater than distance between r-m and m, an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, and pseudoparameres aligned with the ventral support.

**Discussion.** The Australian species *Myopsalta atrata* comb. n. was placed in *Notopsalta* by Dugdale [1972] when he erected the genus. While *atrata* does superficially resemble *Notopsalta*, molecular studies by Hill, Marshall and Simon (pers. comm.) placed *atrata* some distance from the type species *sericea*. The cladistic analysis presented under 'Justification for new genera' in the introductory part of this work supports this distinction and identifies morphological differences. *M. atrata* clearly differs from *N. sericea* in lacking ampliate paranota, lacking a mid lateral tooth on the paranota, having male tergite 2 narrow rather than wide, and having the male sternites swollen so that each is at least partly visible in lateral profile.

## Genus *OWRA* Ashton

*Owra* Ashton, 1912a: 224; Schulze, Kükenthal and Heider 1926–40: 2417; Neave, 1940a: 492; Burns, 1957: 642; Metcalf, 1963: 252; Duffels and van der Laan, 1985: 248, Moulds, 1990: 184–185; de Boer, 1992b: 18, 19, 20, 22; de Boer, 1993a: 16, 17; de Boer, 1993b: 142; de Boer, 1995a: 8; de Boer, 1995b: 204, 210, 214, 215; de Boer, 1995c: 2, 6; de Boer, 1995d: 218, 219, 222, 224, 225, 233; de Boer, 1996: 352, 354; de Boer and Duffels, 1996a: 115, 168, 170, 171; de Boer and Duffels, 1996b: 301, 304; de Boer, 1997: 91, 92, 93, 96, 97, 98, 106, 107; Moulds, 2005a: 390, 413, 430, 435.

**Type species:** *Owra insignis* Ashton, 1912, by original designation.

**Included species:** AUSTRALIAN: *insignis* Ashton, 1912. OTHERS: none.

**Distribution** (Fig. 167g): Confined to the narrow coastal region and coastal mountains of north-eastern Queensland, from near Daintree to Mission Beach (Moulds 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 167e) hyaline; with 10 apical cells (sometimes 9 if aberrant, but usually so only in one wing); a series of usually 4 subapical cells; ulnar cell 3 substantially parallel to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma absent; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation absent; wing outer margin greatly reduced and in part contiguous with ambient vein. *Hind wings* (Fig. 167f) with 5 apical cells (sometimes 6 or 4 if aberrant, but usually only in one wing) no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* very small, barely developed beyond limits of epimeron 3. *Male abdomen* in cross-section with sides of tergites concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* covers absent, timbal ribs many and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases.

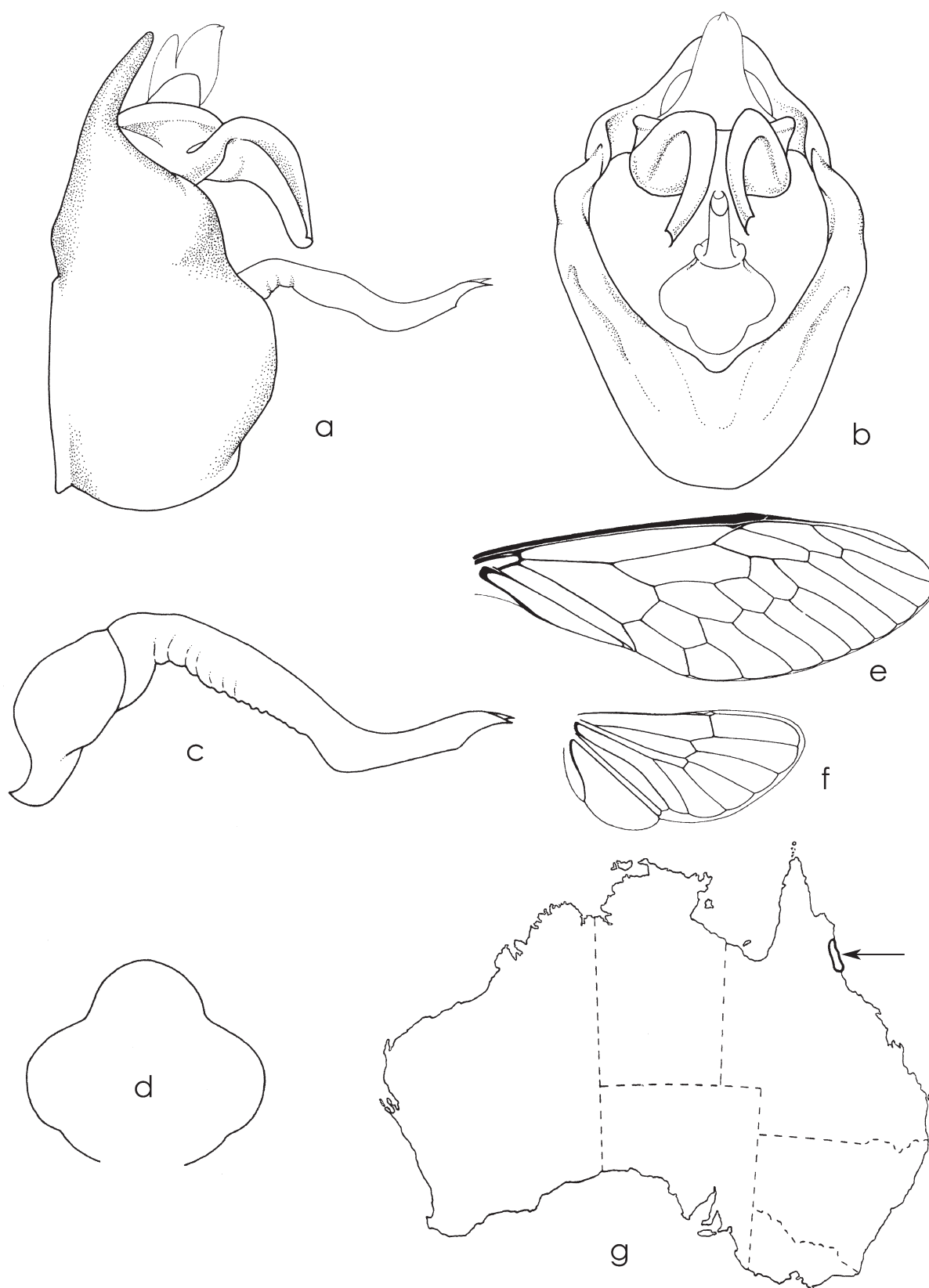
*Male genitalia* (Figs 167a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Fore wing with 10 apical cells (rarely 9) and a row of usually 4 subapical cells; fore wing outer margin in part contiguous with ambient vein. This is the only genus with males virtually lacking development of the opercula beyond the epimeron.

The male genitalia have a distinct thecal apex that is U-shaped in dorsal view and sharply pointed in lateral view.

**Discussion.** De Boer (1995b) defines this genus and discusses its phylogenetic relationships. Moulds (2005a) further discusses phylogenetic relationships. Notes on the distribution and biology of the single species included in this genus are provided by Moulds (1990).



**FIGURE 167.** Genus *Owra* Ashton: (a) *O. insignis* Ashton, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution.

## Genus *OXYPLEURA* Amyot and Serville

*Oxypleura* Amyot and Serville, 1943: 469; Westwood, 1843: 33; Agassiz, Erichson and Germar, 1846: 10; Agassiz, 1848: 773; Spinola, 1850: 50; Walker, 1850: 23, 258; Stål, 1855: 89; Walker, 1858a: 1, 2; Walker, 1858b: 308; Desmarest, 1859: 203; Dohrn, 1859: 72; Gerstaecker, 1863: 299; Stål, 1866a: 9; Dallas, 1867: 556; Walker, 1870: 83; Butler, 1874: 195; Distant, 1889: 19; Karsch, 1890a: 86, 103; Kirkaldy, 1903b: 232; Distant 1904a: 296, 297; Goding and Froggatt, 1904: 568; Imhof, 1905: 223; Distant, 1906c: 58; Distant, 1906d: 5; Distant, 1906f: 171; Oshanin, 1906: 1; Matsumura, 1907: 94; Distant, 1912a: 6, 7; Oshanin, 1912: 94; Delétang, 1923: 611; Moulton, 1923: 139; Hesse, 1925: 141; Schulze, Kükenthal and Heider, 1926–40: 2424; Kato, 1932: 221; Chen, 1933: 3; Wu, 1935: 1; Ouchi, 1938: 75; Neave, 1940a: 498; Metcalf, 1944: 154; Kato, 1961: 3; Nast, 1972: 136; Boulard, 1973: 1161, 1162, 1166, 1168, 1184; Hayashi, 1974: 233; Moulds 1990: 12, 31, 52; Moulds, 2005a: 387–389, 392, 412, 430, 433.

**Type species:** *Oxypleura clara* Amyot and Serville, 1843, by monotypy.

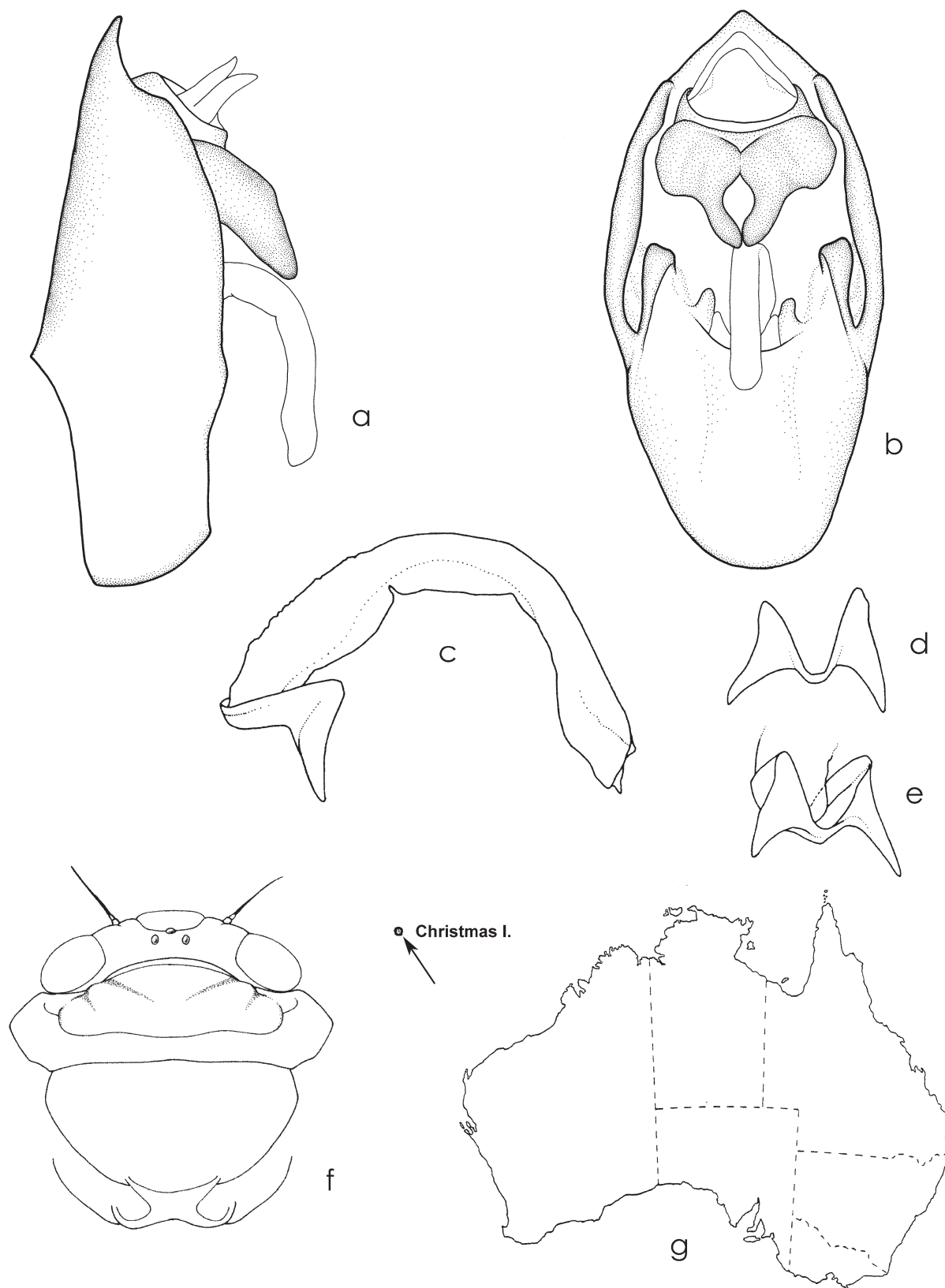
**Included species:** AUSTRALIAN: *calypso* (Kirby, 1889). OTHERS: *atkinsoni* (Distant, 1912); *basalis* Signoret, 1891; *bufo* Walker, 1850; *canescens* Walker, 1870; *centralis* (Distant, 1897); *cervina* (Walker, 1850); *clara* Amyot and Serville, 1843; *ethiopiensis* Boulard, 1975; *lineatella* (Distant, 1905); *polita* Walker, 1850; *polydorus* Walker, 1850; *quadraticollis* (Butler, 1874); *spoerryae* Boulard, 1980.

**Distribution** (Fig. 168g): Within Australia restricted to Christmas Island, Indian Ocean; otherwise through Africa, south-east Asia and India.

**Diagnosis.** *Head* (Fig. 168f) including eyes about as wide as mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 168f): pronotal collar width at dorsal midline much less than diameter of eyes; paranota strongly ampliate, triangular, sometimes sharply pointed, horizontal in lateral view; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa reducing to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; vein M3 divided by cross vein so that proximal and distal portions nearly equal; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells in some species and usually weak in intensity, also sometimes a hint of infuscation on lateral veins near ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* usually with 6 apical cells, 5 in *O. calypso*; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine lying flat. *Male opercula* covering rim of distal margin of tympanal cavity, reaching clearly beyond level of distal margin of tergite 2; deeply depressed at junction of outer and inner (epimeron 3) sections; overlapping. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* covers present, flat, fully rounded dorsally and extending to metathorax but not tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 168a–e). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant, deeply divided apically; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft curved in a gentle arc; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system. Unknown.

*Female reproductive system.* Ditrysian; length of accessory glands unknown.



**FIGURE 168.** Genus *Oxypleura* Amyot and Serville: (a) *O. calypso* (Kirby), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, basal plate, dorsolateral view; (f) head and pronotum, dorsal view; (g) generic distribution in Australia.



**Distinguishing characters.** Medium to large cicadas. Clearly differs from other Australian genera in the broad, flat profile of the body. Vein M3 is strongly bowed and very long proximal of the cross vein (about equal in length to that portion distal of the cross vein), a character otherwise found among Australian genera only in *Dicropyga*.

**Discussion.** *Oxypleura* is closely allied to *Platypleura* Amyot and Serville and to several other exotic genera (mainly from Africa), and for many years it was treated as a junior synonym of *Platypleura*. *Oxypleura* is separated from *Platypleura* mainly by the shape of the uncus of the male genitalia (Boulard 1973). It is not closely allied to any other Australian genus (except perhaps *Talcopsaltria*) and its inclusion in the Australian fauna stems solely from its presence on Christmas Island, Indian Ocean. The fauna of this island tends towards that of South-East Asia rather than continental Australia. The genus has been partly revised by Boulard (1973). Phylogenetic relationships are shown in the cladistic analysis of Moulds (2005a).

Notes on the distribution and biology of the single Australian species of this genus are provided by Moulds (1990).

### Genus *PALAPSALTA* gen. n.

**Type species:** *Melampsalta eyrei* Distant, 1882.

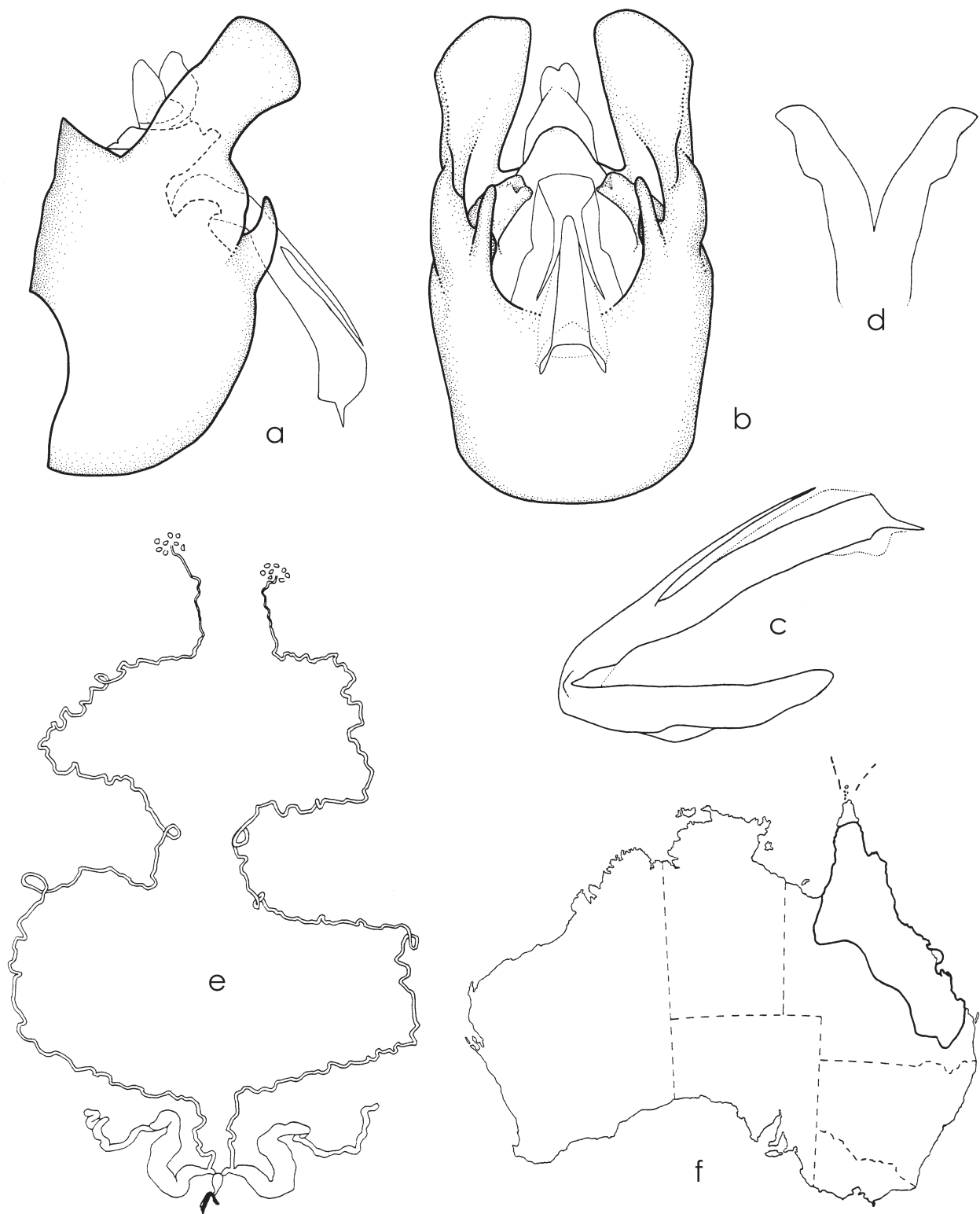
**Included species:** AUSTRALIAN: *circumdata* (Walker, 1852), **comb. n.**; *eyrei* (Distant, 1882), **comb. n.**; *virgulatus* Ewart, 1989, **comb. n.**; *vitellinus* (Ewart, 1989), **comb. n.** OTHERS: none.

**Distribution** (Fig. 169f): Eastern Queensland, including most of Cape York Peninsula, and thereafter in a broad band inland to Mt Isa and south to Lake Broadwater in the south-east of the State.

**Etymology.** From the Latin *pala*, meaning palette and referring to the large palette-like upper pygofer lobes of the male, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum; metanotum partly visible at dorsal midline. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells (sometimes 5); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex but dried museum specimens often deformed. *Timbal* ribs irregular in size and spaced with prominent intermediate short ribs, usually 4 in number; very large basal dome; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 169a–d). Pygofer with distal shoulders not developed; upper lobes very flat, very large, dominating pygofer between basal lobes and dorsal beak; basal lobes undivided, large, in lateral view projecting outwards, basically triangular but sometimes distally elongate; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view Y-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a small functional 'hinge' substantially



**FIGURE 169.** Genus *Palapsalta* gen.n.: (a) *P. eyrei* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, male reproductive system, dissection with aedeagus removed from pygofer; (f) generic distribution in Australia.

compressed between theca and basal plate in lateral view; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; endotheca exposed, ridged, in part or entirely chitinized; endothecal ventral support absent; thecal apex partly or entirely fleshy, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system (Fig. 169e) with accessory glands short.

*Female reproductive system* ditrysian; length of accessory glands of common oviduct unknown.

**Distinguishing characters.** Small cicadas. The head including eyes is broad (clearly wider than mesonotum between wings between wings), and the fore wing costa is broadest a little before the node. Differs from *Pauropsalta* in the above characters plus the absence of infuscation on the hind wing at the distal end of vein 2A (although weak infuscation is occasionally present in some individuals), and also notably in the male genitalia which have a large basal lobe that in lateral view is essentially triangular or sometimes distally elongate. Further, unlike many *Pauropsalta* species, hind wing vein 3A meets the margin at about 90 degrees rather than at an acute angle.

Females appear most similar to those of *Taurella* but can be distinguished by the lengths of the four vein sections making up the inner margin of the radial cell which in *Palapsalta* are clearly not similar in length.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis of Moulds (2005a) by the inclusion of the type species *Pauropsalta eyrei* and *P. circumdata*. Notes on the distribution, biology and songs of the species of this genus are provided by Ewart (1993, 1989b) and Moulds (1990). Notes on seasonal occurrence and plant association of *P. circumdata* in western Sydney are provided by Emery *et al.* (2005). Notes on the habitat of *P. vitellinus* are provided by Popple & Strange (2002).

### Genus *PARADINA* gen. n.

**Type species:** *Melampsalta leichardti* Distant, 1882 (Pl. 2, figs 13a, 13b).

**Included species:** AUSTRALIAN: *leichardti* (Distant, 1882), **comb. n.** OTHERS: none.

**Etymology.** Derived from the Greek *para* meaning near, beside, and *dina* being the latter part of the generic name *Mugadina* to which it is closely allied. Feminine.

**Distribution** (Fig. 170e): Inland northern Queensland from near Hughenden and the Clermont district.

**Diagnosis.** *Head* (Fig. 170g) including eyes about as wide or narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum; metanotum partly visible at dorsal midline. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node (but sometimes slightly thickened before node), costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused for much of their length; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation often absent, in some species overlaying veins at bases of apical cells 2 and 3, and sometimes extending along distal ends of veins forming apical cells and onto wing margins; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 5 apical cells (sometimes 4 or 6 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe narrow with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* bulbous, broadest a little anterior of mid length, much wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, wider along dorsal midline than any one of tergites 3–7; sternites III–VII

in cross-section convex, unusually swollen so that each is partly visible in lateral profile. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

**Male genitalia** (Figs 170a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, restraining aedeagus; large, dominant, claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends, their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view short and broad, apically broadened with 'ears' and far broader than long; basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate, junction between theca and basal plate with a functional 'hinge' that is small, and substantially compressed between theca and basal plate; thecal shaft nearly straight, parallel-sided, thick-set; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of their length with distal portion turned down, proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Very small cicadas. Differ from all other Australian genera except *Graminitigrina* and *Mugadina* in having a combination of fore wing veins M and CuA meeting the basal cell completely fused as one, hind wings with 5 apical cells (sometimes 4 or 6 if aberrant but usually so only in one wing), the fore wing apical cells similar in length to the ulnar cells and a male abdomen that is markedly swollen and bulbous. *Paradina* differs significantly from *Graminitigrina* in the male genitalia which have pseudoparameres that are very short and arise subapically while those of *Graminitigrina* are very long and arise near the base of the theca. Distinguished from *Mugadina* in having the male abdomen a little less swollen and genitalia with well developed pseudoparameres, a ventral support and an exposed endotheca. The single known species in this genus is substantially black (Pl. 2, figs 13a, 13b).

The male genitalia have an aedeagus with a typically 'trifid' theca with pseudoparameres that are parallel and abutted on their basal half or so before diverging.

*Paradina* is also somewhat similar to *Dipsopsalta*, *Pipilopsalta* and *Uradolichos* because of the swollen male abdomen; it differs from *Dipsopsalta* in not having short apical cells, from *Pipilopsalta* and *Uradolichos* in having the width of head including eyes about as wide or wider than lateral angles of pronotal collar instead of much narrower.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.

## Review of selected species

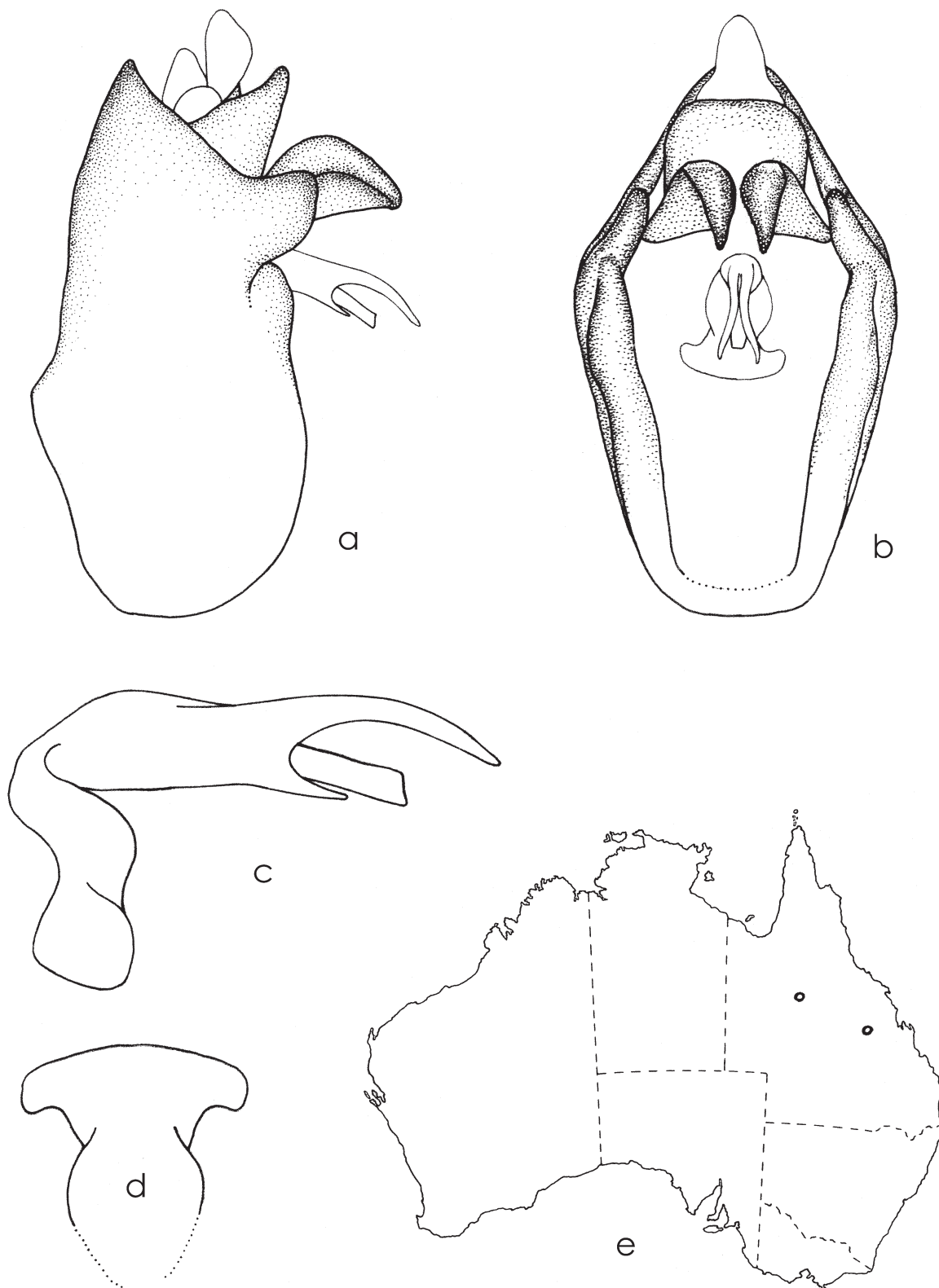
### *Paradina leichardti* comb. n. (Pl. 2, figs 13a, 13b)

*Melampsalta leichardti* Distant, 1882: 132, pl. VII, fig 5, 5a, 5b

*Pauropsalta leichardti*: Goding and Froggatt, 1904: 566

*Urabunana segmentaria* Distant, 1905g: 274 **Syn. n.**

*Urabunana leichardti*: Distant, 1906d: 181



**FIGURE 170.** Genus *Paradina* **gen. n.:** (a) *P. leichardti* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) generic distribution.



The type of *Urabunana segmentaria* is a male while that of *Melampsalta leichardti* is a female of the same species. I have taken both sexes from near Hughenden and near Clermont, northern Queensland.

The original description gives the spelling '*leichardti*'. The species appears to have been named after the Australian explorer Ludwig Leichhardt (Distant appears to have named several species after Australian explorers). However, he never actually stated the derivation of these names and consequently Distant's original spelling of *leichardti* should be retained (ICZN, 4th edition, Article 32.5.1).

### Genus *PARNKALLA* Distant

*Parnkalla* Distant 1905e: 26, 29; Distant, 1906d: 128, 133; Ashton, 1914a: 350; Delétang, 1923: 629; Schulze, Kükenthal and Heider, 1926–40: 2535; Kato, 1932: 180, 181; Neave, 1940a: 614; Kato, 1956: 69; Burns, 1957: 638; Metcalf, 1963: 214; Duffels and van der Laan, 1985: 236; Moulds, 1990: 124; Moulds, 2005a: 393, 403, 412, 413, 416, 425, 430, 434.

**Type species:** *Tibicen muelleri* Distant, 1882, by original designation.

**Included species:** AUSTRALIAN: *muelleri* (Distant, 1882). OTHERS: none.

**Excluded species:** *magna* Distant, to *Parnquila* **gen. n., q.v.**

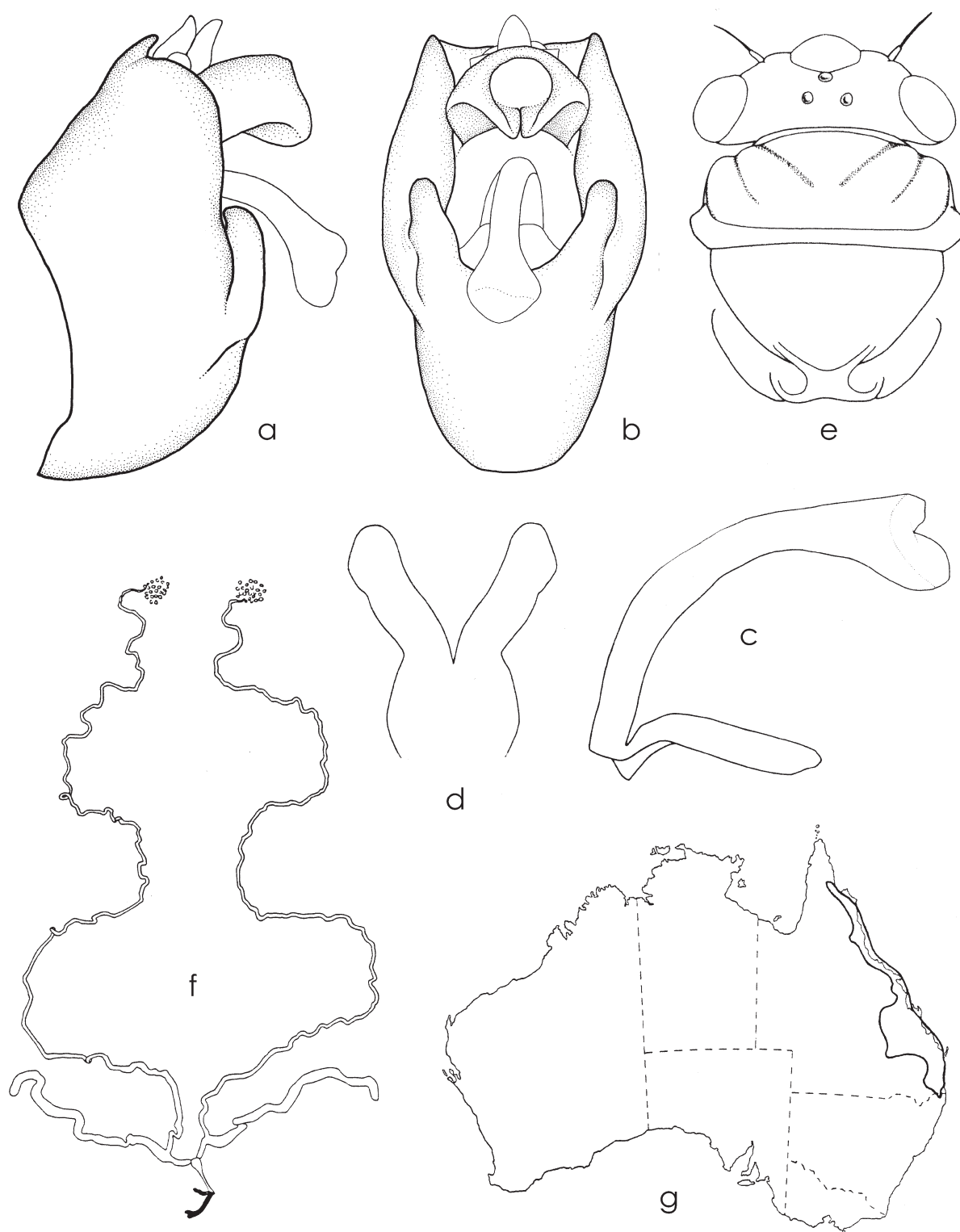
**Distribution** (Fig. 171g): Eastern Queensland south from Coen to the far north-eastern corner of New South Wales (Moulds 1990).

**Diagnosis.** *Head* (Fig. 171e) including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 171e): pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3 and at distal end of RA<sub>2</sub>; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end longer than 2nd cubital cell but clearly less than twice as long; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less confluent with distal margin of tympanal cavity, well developed towards abdominal midline with sharply rounded apex facing midline, clearly separated. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* covers present but only as a well developed ridge lacking anterior development; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 171a–d). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view V-shaped, the division reaching to theca; basal portion of basal plate directed upwards so as to be nearly parallel with thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system (Fig. 171f) with accessory glands short.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Distinguished from other Australian genera by its pale straw-coloured body in conjunction with bold infuscations on the fore wings only at the bases of apical cells 2 and 3 and to a lesser extent at the distal end of vein RA<sub>2</sub>; in these characters it is similar to *Tamasa* but differs in lacking ampliation of the lateral margin of the pronotal collar which is virtually confluent with the surface of the pronotum.



**FIGURE 171.** Genus *Parnkalla* Distant: (a) *P. muelleri* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and pronotum, dorsal view; (f) male reproductive system, dissection with aedeagus removed from pygofer; (g) generic distribution.

The male genitalia have a characteristic nearly-tubular, short uncus and a basal plate that has its basal position directed upwards so as to be nearly parallel with the thecal shaft, features otherwise found only in *Tamasa* and *Parnquila*. However, *Parnkalla* differs from *Tamasa* in lacking ornamentation at the thecal apex, while the basal plate of *Parnkalla* differs significantly from that of *Parnquila* by its deep bifurcation on the distal half and an apical gonopore.

*Parnkalla* has other similarities with *Parnquila* but it differs from *Parnquila* in having the epimeral lobe reaching the operculum. Further, the male timbal covers are substantially reduced in *Parnkalla* to appear virtually absent but in *Parnquila* they are well developed and cover about half the timbal cavity.

**Discussion.** Phylogenetic relationships of this monotypic genus are discussed in Moulds (2005a). The biology of *Parnkalla muelleri* has been reviewed in detail by Moulds (1990).

### Genus *PARNKALLA* gen. n.

**Type species:** *Parnkalla magna* Distant, 1913 (Pl. 1, figs 10a, 10b).

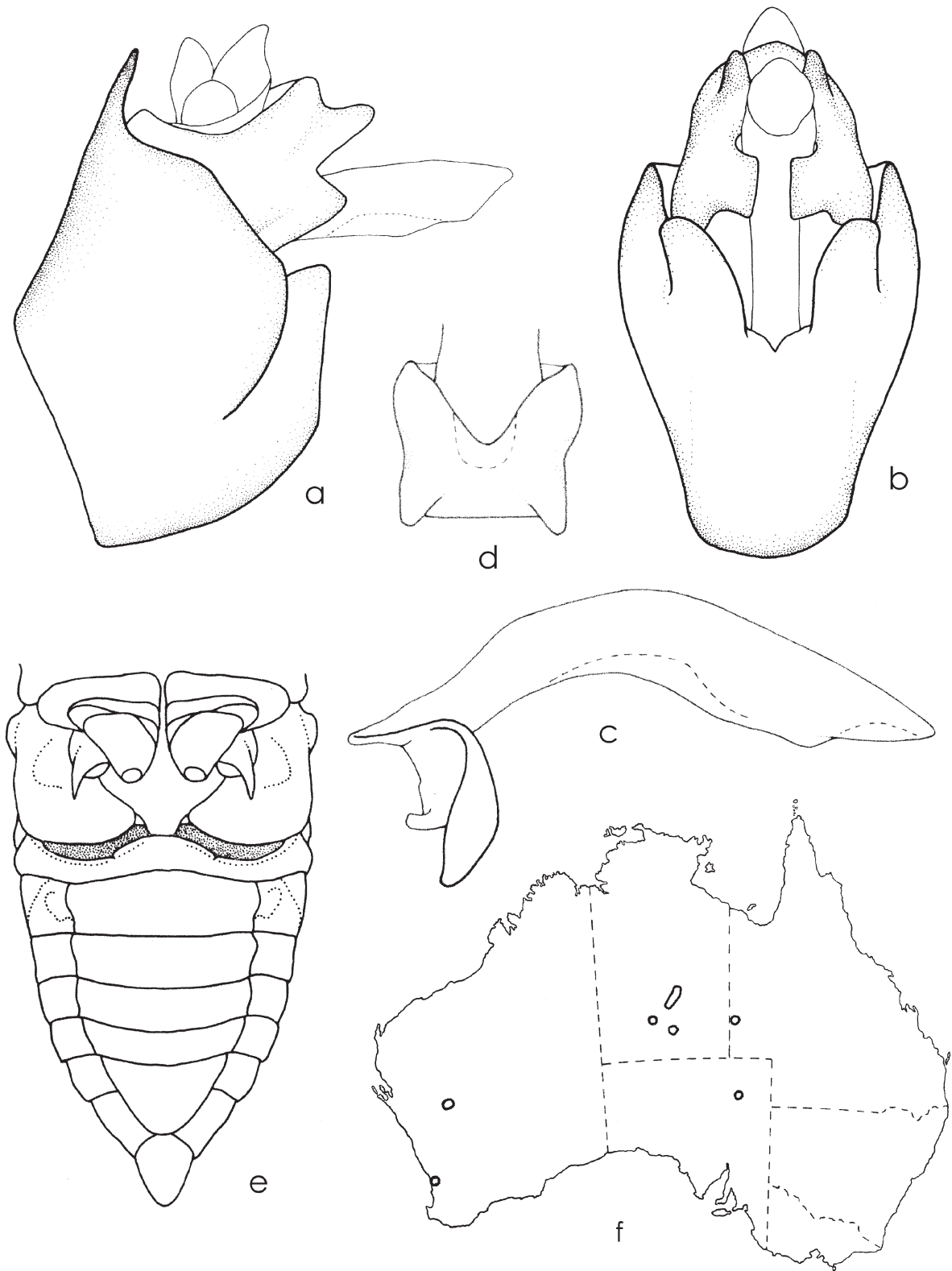
**Included species:** AUSTRALIAN: *hillieri* (Distant, 1906), **comb. n.**; *magna* (Distant, 1913), **comb. n.**; *venosa* (Distant, 1907), **comb. n.**; *unicolor* (Ashton, 1921), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *aquilus* meaning dark-coloured or blackish and referring to the blackish colour of the type species, and the prefix *parn* taken from the name of the genus *Parnkalla* in which genus the type species was previously located. Feminine.

**Distribution** (Fig. 172f): Perth (type locality of *unicolor*) and Cue (type locality of *magna*) in Western Australia, Hermannsburg (type locality of *venosa*) and other localities around Alice Springs in the Northern Territory, the north-eastern edge of the Simpson Desert in Queensland (Ewart 2009a), and the south-eastern edge of the Simpson Desert in South Australia.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent or nearly so with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; sub-apical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion either similar in length to distal portion or longer; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end longer than 2nd cubital cell but clearly less than twice as long; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 172e) more or less confluent with distal margin of tympanal cavity, well developed towards abdominal midline with sharply rounded apex facing midline, not meeting. *Male abdomen* (Fig. 172e) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 similar in size to tergites 4–7 except in *unicolor* where they are slightly larger; sternites III–VII in cross-section convex. *Timbal* covers present, flat, reduced dorsally and not reaching metathorax, lower margin extending anteriorly from or very near auditory capsule; timbal ribs regular in width and spaced with prominent intermediate short ribs; usually a large basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 172a–d). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant, with characteristic, thick-set lateral process; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply turned through 90° or more; in dorsal view apically rounded and with V-shaped depression basally from which theca arises; basal portion of basal plate directed upwards so as to be nearly parallel with thecal shaft; ventral rib completely fused with basal plate but with an anterior, sclerotized, tubular projection turned backwards;



**FIGURE 172.** Genus *Parnquila* gen.n.: (a) *P. magna* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, underside of male abdomen showing opercula; (f) generic distribution.

junction between theca and basal plate rigid, without a 'hinge'; thecal shaft curved in a gentle arc; pseudoparameres absent; thecal apex lightly sclerotized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening ventral at apex of theca. *Male reproductive system* unknown.

*Female reproductive system* unknown.

**Distinguishing characters.** Small to medium-sized cicadas considerably variable in colour between species (Pl. 1, figs 10a, 10b, type species). Distinguished from all other Australian genera except *Burbunga* by having the combination of a metanotum entirely concealed at dorsal midline, the basal cell of the fore wing long and slender, the epimeral lobe not reaching the operculum, and the apices of the supra-antennal plate rounded in dorsal view rather than pointed. In addition the male timbal covers are reduced and do not close the timbal cavities.

Distinguished from *Burbunga* by the male genitalia. The male genitalia have a pair of characteristic lobed lateral processes near the apex of the uncus and a pair of flat clasping processes ventrally (Fig. 172a, b). Further, the vesica opening (gonopore) is ventrally positioned at the apex of the theca and the basal plate bears a fused ventral rib with a distinct anterior tubular projection that turns backwards.

**Discussion.** The four species placed here appear somewhat diverse in their overall shape and colour but are otherwise remarkably similar in morphology, especially in that of the male genitalia. Certainly *hillieri* and *venosa* are sister species with nearly identical body forms. The most divergent of the four species is *unicolor* that differs in having a slightly ampliate pronotal collar and small differences in the male abdomen but otherwise seems well placed with the other species.

The tribal placement of *Parnquila* is unclear. It appears to be allied to the Tamasini where the theca of the aedeagus arises more or less vertically from the basal plate. But it differs from the Tamasini in having the epimeral lobe not reaching the operculum, an attribute that better associates *Parnquila* with the Burbungini. I here tenuously place *Parnquila* in the Tamasini because the majority of its features appear more compatible there.

Notes on the distribution and habitat of *P. hillieri* (as *Burbunga hillieri*) are provided by Moulds (1990). Notes on *P. venosa* (as *Burbunga venosa*), including an analysis of its song, are provided by Ewart (2009a).

### Genus *PAUOPSALTA* Goding and Froggatt

*Pauropsalta* Goding and Froggatt, 1904: 565, 596, 615; Distant, 1905g: 269, 272; Distant, 1906c: 171, 174; Distant, 1906d: 163, 178; Distant, 1907: 246; Froggatt, 1907: 354; Oshanin, 1908: 399; Bergroth, 1911: 188; Horváth, 1911: 607; Ashton, 1912b: 27; Ashton, 1912d: 80; Ashton, 1914a: 355; Horváth 1912a: 605; Oshanin 1912: 96; Ashton 1914a: 355; Hardy, 1918: 71; Davis, 1920: 125; Distant, 1920: 376; Myers, 1922: 9; Myers, 1923: 430; Handlirsch, 1925: 1116; Kato, 1926: 151; Tillyard, 1926: 161; Schulze, Kükenthal and Heider, 1926–40: 2548; Hudson, 1927: 73; Myers, 1928b: 391; Haupt, 1929: 220; Myers, 1929a: 29; Kato, 1932: 38, 111, 385, 386; Chen, 1933: 40; Haupt, 1935: 151; Wu, 1935: 27; Ouchi, 1938: 108; Neave, 1940a: 628; Cooper, 1941: 295; de Seabra 1942: 7; Chen, 1943: 37; McKeown, 1944: 235; Metcalf, 1944: 156; Metcalf, 1947: 163; Gomez-Menor, 1951: 11; Kato, 1956: 25; Gomez-Menor, 1957: 29, 77; Burns, 1957: 645; Dlabola, 1963: 50; Metcalf, 1963: 401–402; Dugdale and Fleming, 1969: 936, 937; Dugdale, 1972: 856, 860, 861, 877, 879, 880; Nast, 1972: 151; Holloway, 1979: 235; Duffels and van der Laan, 1985: 300; Boulard, 1988: 40; Ewart, 1989b: 289–294; Moulds, 1990: 130–131; Boulard, 1993: 109; de Boer, 1995d: 201, 202, 234; de Boer and Duffels, 1996b: 306, 309; Boulard, 1997: 179, 191, 195; Boulard, 1998: 109; Moulds, 2005a: 390, 412, 430, 436.

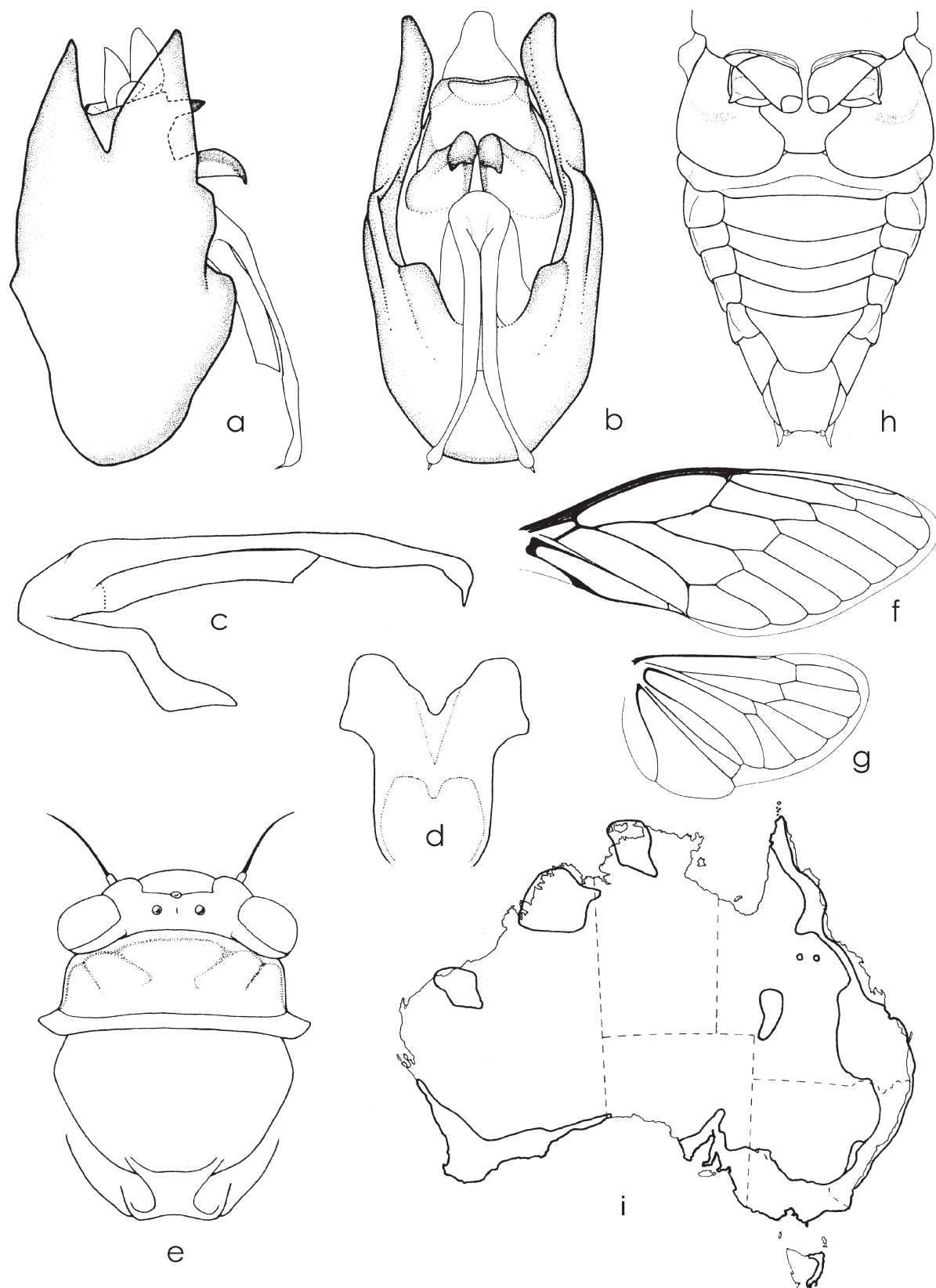
*Cicadetta* (*Pauropsalta*); Horváth, 1911: 607; Horváth, 1912a: 605.

*Melampsalta* (*Pauropsalta*); Oshanin, 1912: 96; de Seabra, 1942: 7.

**Type species:** *Cicada mneme* Walker, 1850, by original designation.

**Included species:** AUSTRALIAN: *aktites* Ewart, 1989; *annulata* Goding and Froggatt, 1904; *aquila* Ewart, 1989; *ayrensis* Ewart, 1989; *borealis* Goding and Froggatt, 1904; *collina* Ewart, 1989; *corticina* Ewart, 1989; *dolens* (Walker, 1850); *elgneri* (Ashton, 1912); *encaustica* (Germar, 1834); *extensa* Goding and Froggatt, 1904; *extrema* (Distant, 1892); *fuscata* Ewart, 1989; *infrasila* Moulds, 1987; *infusata* (Goding and Froggatt, 1904); *melanopygia* (Germar, 1834); *mneme* (Walker, 1850); *nigristriga* Goding and Froggatt, 1904; *opaca* Ewart, 1989; *prolongata* Goding and Froggatt, 1904; *rubea* (Goding and Froggatt, 1904); *rubra* Goding and Froggatt, 1904; *rubristrigata* (Goding and Froggatt, 1904); *siccana* Ewart, 1989; *stigmatica* Distant, 1905; *walkeri* Moulds and Owen, 2011. OTHERS: *exaequata* (Distant, 1892); *johanae* Boulard, 1993; *judithae* Boulard, 1997; *mimica* Distant, 1907; *rufifascia* (Walker, 1850) [Representatives of these species were not available for examination.]





**FIGURE 173.** Genus *Pauropsalta* Goding and Froggatt: (a) *P. mneme* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and pronotum, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) the same, underside of male body showing opercula; (i) generic distribution in Australia.

**Excluded species:** The following are synonymised or transferred to other genera as listed.

*basalis* Goding and Froggatt, 1904, to *Nanopsalta* **gen. n.**, *q.v.*

*bellatrix* Ashton, 1914, to *Physeema* **gen. n.**, *q.v.*

*circumdata* (Walker, 1852), to *Palapsalta* **gen. n.**, *q.v.*

*dubia* Goding and Froggatt, 1904, to *Platypsalta* **gen. n.**, *q.v.*

*emma* Goding and Froggatt, 1904, to *Mugadina* **gen. n.**, *q.v.*

*eyrei* Distant, 1882, to *Palapsalta*, *q.v.*

*lineola* Ashton, 1914, a junior synonym of *Dipsopsalta signata*, *q.v.*

*nebulosa* Goding and Froggatt, 1904, a junior synonym of *Pauropsalta rubea*, see below

*nodicosta* Goding and Froggatt, 1904, to *Clinata* **gen. n.**, *q.v.*

*signata* Distant, 1914, to *Dipsopsalta* **gen. n.**, *q.v.*

*virgulatus* Ewart, 1989, to *Palapsalta*, *q.v.*

*vitellinus* Ewart, 1989, to *Palapsalta*, *q.v.*

**Distribution** (Fig. 173i): Throughout much of Australia including Tasmania, especially monsoonal regions but absent from much of the dry interior (Ewart and Popple 2001, Moulds 1990). Also in Papua New Guinea, Philippine Islands, New Caledonia, the Mediterranean Region, Nepal and South Africa although the placement of most of these species in *Pauropsalta* appears to be erroneous.

**Diagnosis.** *Head* (Fig. 173e) including eyes about as wide as mesonotum, sometimes a little narrower, sometimes a little wider; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax* (Fig. 173e): pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 173f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 173g) with 5 or 6 apical cells (sometimes 4 if aberrant, but usually only in one wing); infuscation at distal end of vein 2A spread on wing margin; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 173h) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 173h) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.

*Male genitalia* (Figs 173a–d). Pygofer with distal shoulders not developed; upper lobes very flat, very well developed, dominating pygofer between basal lobes and dorsal beak, elongate and usually expanded apically like a pair of horse blinkers; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view tending to be Y shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge'; hinge small, substantially compressed between theca and basal plate in lateral view; thecal shaft straight or curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; endotheca exposed, ridged, entirely chitinated; endothecal ventral support absent; thecal apex entirely chitinated, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. Male reproductive system with accessory glands short.

*Female reproductive system* ditrysian; length of accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Small cicadas. The hind wing infuscation at the distal end of vein 2A that is spread onto the wing margin, together with the complete fusion or close abutment of veins M and CuA on reaching the basal cell, clearly distinguishes this genus from all others except *Caliginopsalta* and *Nanopsalta*. The head of most species is never wider than the mesonotum as it is in *Caliginopsalta* and *Nanopsalta* and other similar looking genera such as *Taurella* and *Palapsalta*.

The male genitalia clearly differ from those of *Caliginopsalta* and *Nanopsalta*, plus most other genera, in having the upper pygofer lobes exceptionally large. The aedeagus shows considerable variation but never has a typically trifold theca or a fleshy endotheca.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis of Moulds (2005a) by the inclusion of *P. encaustica* and the type species *P. mneme*. Ewart (1989b) has reviewed the Queensland species as well as selected species from other States. He also included analyses of songs. Notes on calling behaviour are provided by Ewart (2001b). The distribution and biology of the species of this genus are also reviewed by Moulds (1990) and Haywood (2006a, 2006b). Notes on seasonal occurrence and plant association of *P. mneme* and some undescribed *Pauropsalta* species in western Sydney are provided by Emery *et al.* (2005). Further notes on species, including song analyses, are provided by Coombs (1996), Ewart (1988, 1993, 1995, 1998a, 2005b), Gwynne *et al.* (1988), Popple & Strange (2002), Popple *et al.* (2008) and Young (1972).

## Review of selected species

### *Pauropsalta rubea* (Goding and Froggatt)

*Melampsalta rubea* Goding and Froggatt, 1904: 651.

*Melampsalta nebulosa* Goding and Froggatt, 1904: 647. **Syn. n.**

*Cicadetta rubea* (Goding and Froggatt): Kirkaldy, 1907b: 309.

*Melampsalta geisha* Distant, 1915: 50, 51.

*Cicadetta geisha* (Distant): Metcalf, 1963: 315.

*Pauropsalta rubea* (Goding and Froggatt): Ewart, 1989b: 333.

*Cicadetta nebulosa* (Goding and Froggatt): Metcalf, 1963: 363.

Burns (1957) lists the whereabouts of the type of *Melampsalta nebulosa* as unknown. My search of Australian collections (notably the MM, SAM and ANIC where a number of Goding and Froggatt types are housed), and the collection of the BMNH, has failed to reveal a specimen likely to have type status. The original description, together with the type localities listed i.e. 'Queensland (Tryon); Windsor, N.S.W.', clearly correlate with *Pauropsalta rubea*. No other species is known to meet these criteria (despite the availability of extensive collections) and *M. nebulosa* and *P. rubea* are here considered synonymous.

### Genus *PHYSEEMA* gen. n.

**Type species:** *Cicada quadricincta* Walker, 1850.

**Included species:** *bellatrix* (Ashton, 1914) **comb. n.**; *convergens* (Walker, 1850) **comb. n.**; *labyrinthica* (Walker, 1850) **comb. n.**; *latorea* (Walker, 1850) **comb. n.**; *quadricincta* (Walker, 1850) **comb. n.** OTHERS: none.

**Etymology.** From the Greek *physema* meaning something inflated, a bubble, and referring to the bubble-like swelling at the base of the male operculum. Feminine.

**Distribution** (Fig. 174e) South-western Western Australia south from Kalbarrie to Cape Le Grand with an isolated population at Kalgoorlie, coastal districts of south-eastern South Australia and in Victoria from near Melbourne.

**Diagnosis.** *Head* including eyes about as wide as or a little wider than mesonotum but clearly narrower in *convergens*; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching

operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one (except in some individuals of *P. convergens*); vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent or confined to bases of apical cells 2 and 3; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting; base (remnant of epimeron 3) much swollen and bubble-like. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 wide and swollen around dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, greatly swollen so that each is visible in lateral profile. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal largely free of ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

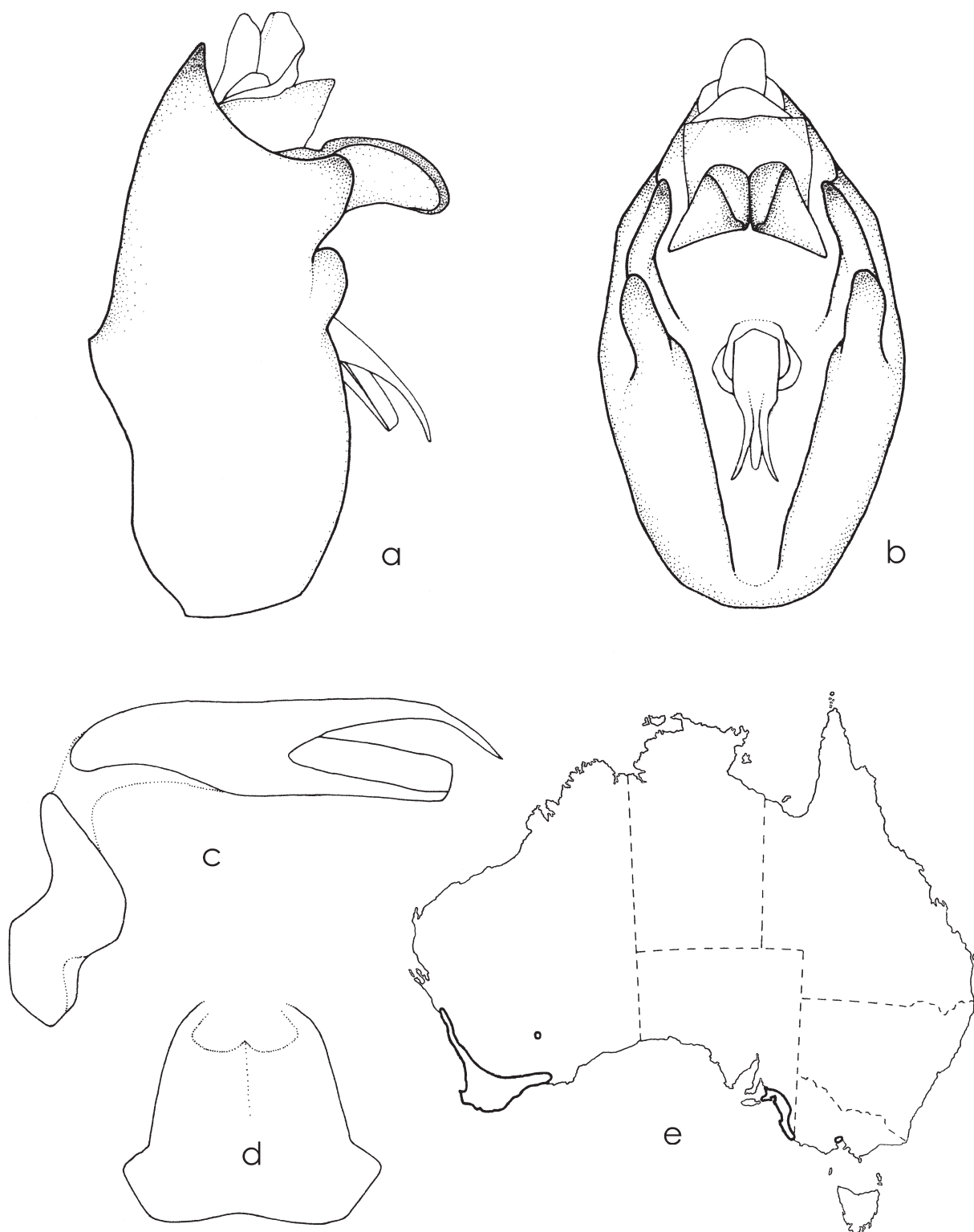
*Male genitalia* (Figs 174a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other (except in *convergens*); their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that is entirely fleshy; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, no more than about half the length of pseudoparameres; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. Male reproductive system unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small to medium-sized cicadas. Distinguished by the following combination of characters: fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the paranota are ampliate with a mid lateral tooth, the distance between fore wing crossveins r and r-m is about equal to or longer than r-m and m, and the male sternites are greatly swollen so that each is usually visible in lateral profile.

The male genitalia have an aedeagus with a theca that is typically 'trifid' exposing a fleshy endotheca, the hinge of the aedeagus is entirely fleshy and without a chitinous back, and the claspers are essentially flat and wide in lateral view and distally parallel in ventral view.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution, habitat and biology of *P. quadricincta* and *P. convergens* are provided by Moulds (1990). Brief notes on the song of *P. quadricincta* can be found in Bennet-Clark and Young (1994) and Moulds (1990). A study of male *P. quadricincta* sexual behaviour including song can be found in Gwynne (1987) and Gwynne *et al.* (1988).



**FIGURE 174.** Genus *Physeema* **gen. n.**: (a) *P. quadricincta* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) generic distribution.



## Review of selected species

### *Physeema bellatrix* (Ashton), comb. n.

*Pauropsalta bellatrix* was described from an unstated number of females from the Warren River, Western Australia. The only known syntype is in the South Australian Museum. In size, head and body shape, wing shape and venation, it matches a species found in the extensive sand dunes around the mouth of the Warren River. Colour is not such a close match but the specimen appears discoloured with age and may be partly teneral. This sand dune species is here considered to be *P. bellatrix*, the males of which clearly place it in the genus *Physeema*.

A male in the AM, from Cue and labelled as a 'cotype' of *Pauropsalta bellatrix*, is not *bellatrix* (nor is it part of the type series) but a specimen of an undescribed *Pauropsalta* species currently under description by Owen and Moulds (in prep). *Pauropsalta bellatrix* was described from the 'Warren River', an area with a high annual rainfall; the undescribed *Pauropsalta* species to which the 'cotype' belongs inhabits only arid regions of Western Australia.

### Genus *PICTILA* gen. n.

**Type species:** *Tibicen occidentalis* Goding and Froggatt, 1904 (Pl. 1, fig. 7).

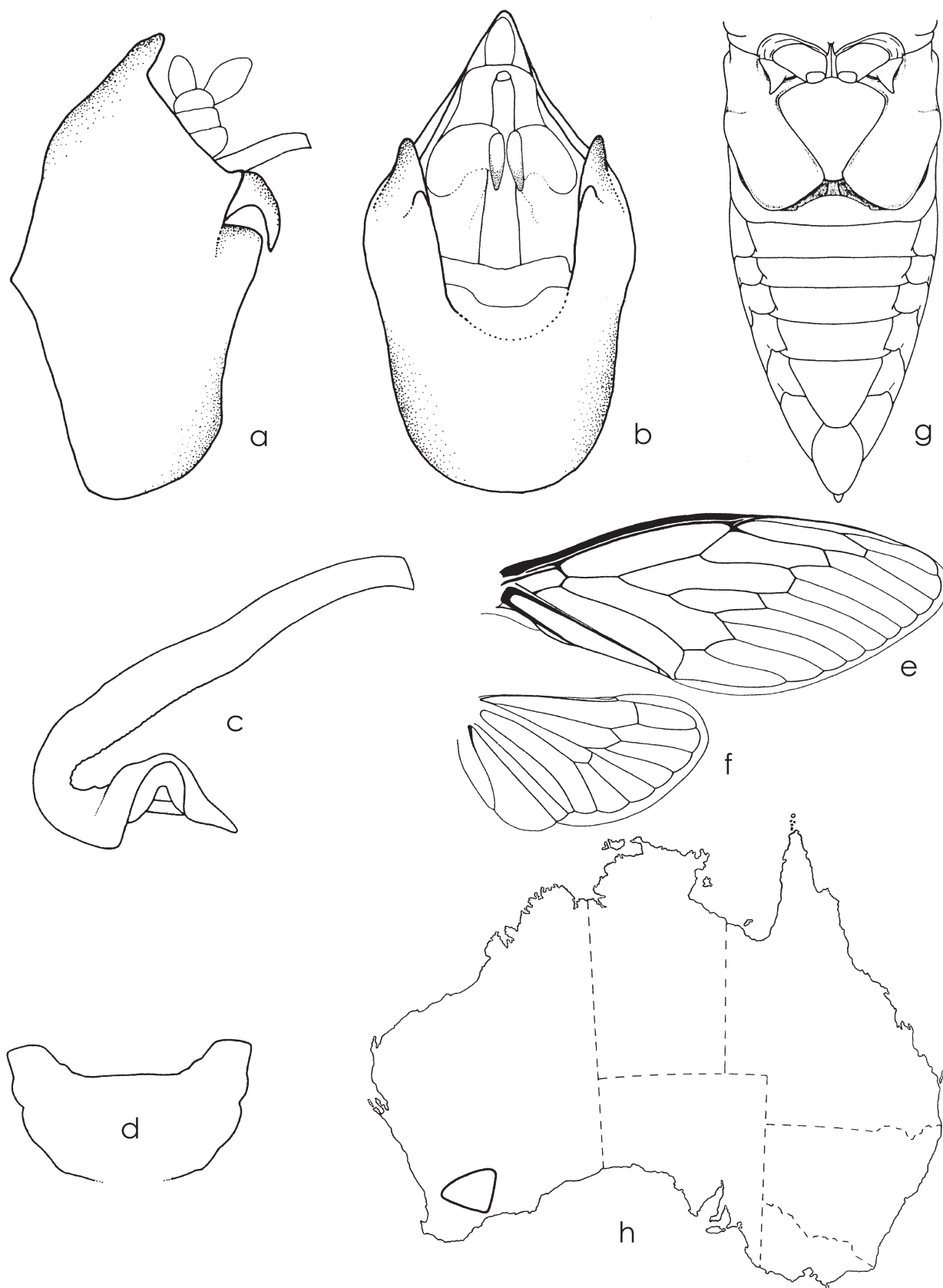
**Included species:** AUSTRALIAN: *occidentalis* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *pictilis* meaning painted and pertaining to the colorful abdomen of the type species.

**Distribution** (Fig. 175h): South-western Western Australia in an area bounded by Queen Victoria Rock (near Coolgardie) in the north, Kondinin and Kulin to the west, and Ravensthorpe in the south.

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; supra-antennal plate nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax:* pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 175e) hyaline; with 10 apical cells (sometimes 9 or 11 if aberrant, but usually so only in one wing); subapical cells usually absent (1 or 2 sometimes present when venation is aberrant); ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 175f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 175g) tending to be linear, both outer and inner margins straight, distal margin broadly rounded, reaching distal margin of tympanal cavity which is almost at level of distal margin of tergite 3, near to each other but clearly not meeting. *Male abdomen* (Fig. 175g) in cross-section with sides of tergites straight or weakly convex with distinct bend at lower third to the vertical, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* covers absent; timbal ribs many (usually 8), and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 175a–d). Pygofer with distal shoulders not developed; upper lobes flat, small, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view basally divided into two discs with apical arms lobe-like; basal portion of basal plate directed forwards away from thecal shaft; ventral rib rod-like with attachment only at ends; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through some 140°; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.



**FIGURE 175.** Genus *Pictila* gen.n.: (a) *P. occidentalis* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) underside of male abdomen showing opercula; (h) generic distribution.

*Female* abdominal segment 9 just a little longer than an equilateral triangle in dorsal view; ovipositor sheath not passing distal ends of anal styles. *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Differs from all other Australian genera by having a broad head that is clearly wider than the mesonotum, 10 fore wing apical cells (sometimes 9 or 11 in aberrant specimens) and veins M and CuA meeting the basal cell separately. The single known species in the genus is brightly coloured orange with black and red markings (Pl. 1, fig. 7).

The male genitalia have a distinctive aedeagus with the basal plate possessing a rod like ventral rib clearly visible in lateral view and a simple, tubular thecal shaft turned through some 140° basally.

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis of Moulds (2005a).

### Genus *PIPILOPSALTA* Ewart

*Pipilopsalta* Ewart, 2005a: 476.

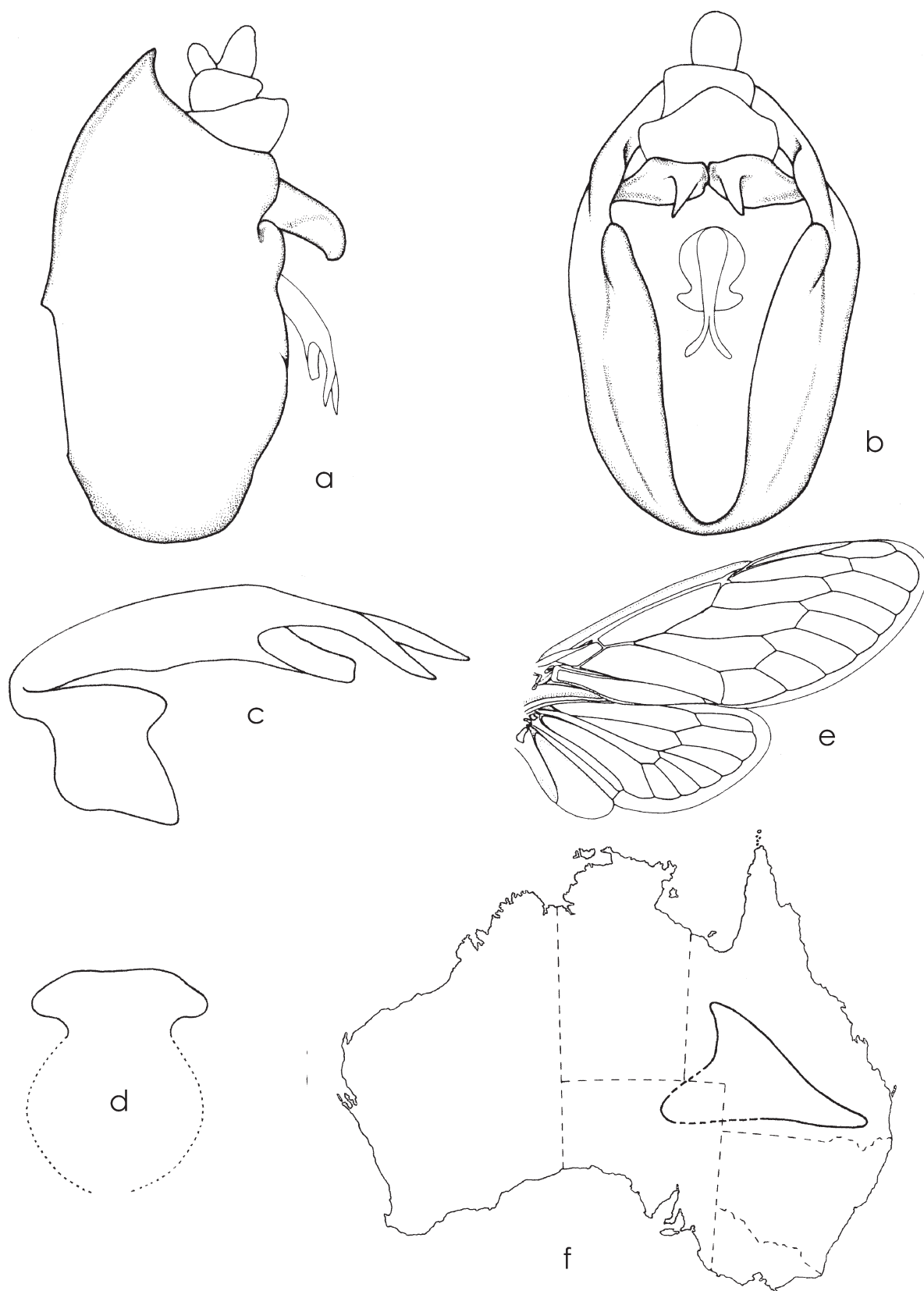
**Type species:** *Pipilopsalta ceuthoviridis* Ewart, 2005, by original designation (Pl. 2, fig. 9).

**Included species:** AUSTRALIAN: *ceuthoviridis* Ewart, 2005. OTHERS: none.

**Distribution** (Fig. 176f): Widespread though inland Queensland south from near Mount Isa and with a single record from South Australia from Neales River south of Oodnadatta (Ewart 2005a).

**Diagnosis.** *Head* including eyes about as wide or a little narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax:* pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 176e) hyaline; infuscation either absent or weak and confined to bases of apical cells 2 and 3; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells mostly about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 176e) with 5 or 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male hind leg* meracanthus short, rounded. *Male opercula* reaching a little beyond margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* a little wider than thorax; tergites in cross-section with sides weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, unusually swollen so that each is partly visible in lateral profile. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases.

*Male genitalia* (Figs 176a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; claw-like with minimal cavity ventrally; unfused; lacking a rounded,



**FIGURE 176.** Genus *Pipilopsalta* Ewart: (a) *P. ceuthoviridis* Ewart, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore and hind wings; (f) generic distribution.

inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view exceedingly short, almost without length, apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft straight or curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, fused for half their length or more, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, less than about half the length of pseudoparameres; thecal subapical cerci absent; flabellum absent; conjunctival claws absent. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished from most genera by the following combination of characters: the fore wing veins M and CuA meet the basal cell with their stems completely fused as one, fore wing apical cells 3–6 are about as long or longer than the ulnar cells, the paranota are confluent with adjoining pronotal sclerites and lack a mid lateral tooth, the male abdomen is not excessively wider than the thorax (less than 1.4x wider), and the fore wing costa is gently and evenly curved. The only known species in this genus, *P. ceuthoviridis*, is almost entirely green (Pl. 2, fig. 9)

The male genitalia have claspers that are claw-like with minimal cavity below and they diverge towards their distal ends; an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, an exceedingly short basal plate and pseudoparameres that are fused for half their length or more.

*Pipilopsalta* is similar to *Dipsopsalta*, *Mugadina* and *Uradolichos* because of the swollen male abdomen; it differs from all except some undescribed *Mugadina* species in its green colouration and from all *Mugadina* in having the width of head including eyes clearly narrower than lateral angles of pronotal collar instead of about the same.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution, habitat and song of *P. ceuthoviridis*, together with figures of the adult, are included in Ewart (2005a).

### Genus *PLATYPLEURA* Amyot and Serville

**Type species:** *Cicada stridula* Linnaeus, 1758, by subsequent designation by Westwood, 1843: 33.

**Included species:** AUSTRALIAN: none. OTHERS: many species occurring through Africa, India and South-east Asia.

**Excluded species:** *tepperi* Goding and Froggatt, 1904, transferred to *Yanga* as a junior synonym of *Y. guttulata* (Signoret, 1860) by Moulds (2010).

**Discussion.** Goding and Froggatt (1904) described this species from the Northern Territory. Burns (1957) considered the species of doubtful Australian origin. Moulds (2010) showed that the one remaining type of *tepperi* was in fact a specimen of the Madagascan species *Yanga guttulata*. Thus, Goding and Froggatt's specimens of *Platypleura tepperi* are considered erroneously labelled and both the species and genus do not occur in Australia.

Phylogenetic relationships of *Platypleura* are shown in the cladistic analysis of Moulds (2005a) by the inclusion of the type species *P. stridula*.

### Genus *PLATYPSALTA* gen. n.

**Type species:** *Pauropsalta dubia* Goding and Froggatt, 1904 (Pl. 2, fig. 8).

**Included species:** *dubia* (Goding and Froggatt, 1904), **comb. n.**; *mixta* (Distant, 1914), **comb. n.**

**Etymology.** From the Greek *platys* meaning broad, wide, level, flat, and referring to the very broad fore wings of the species in this genus, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.



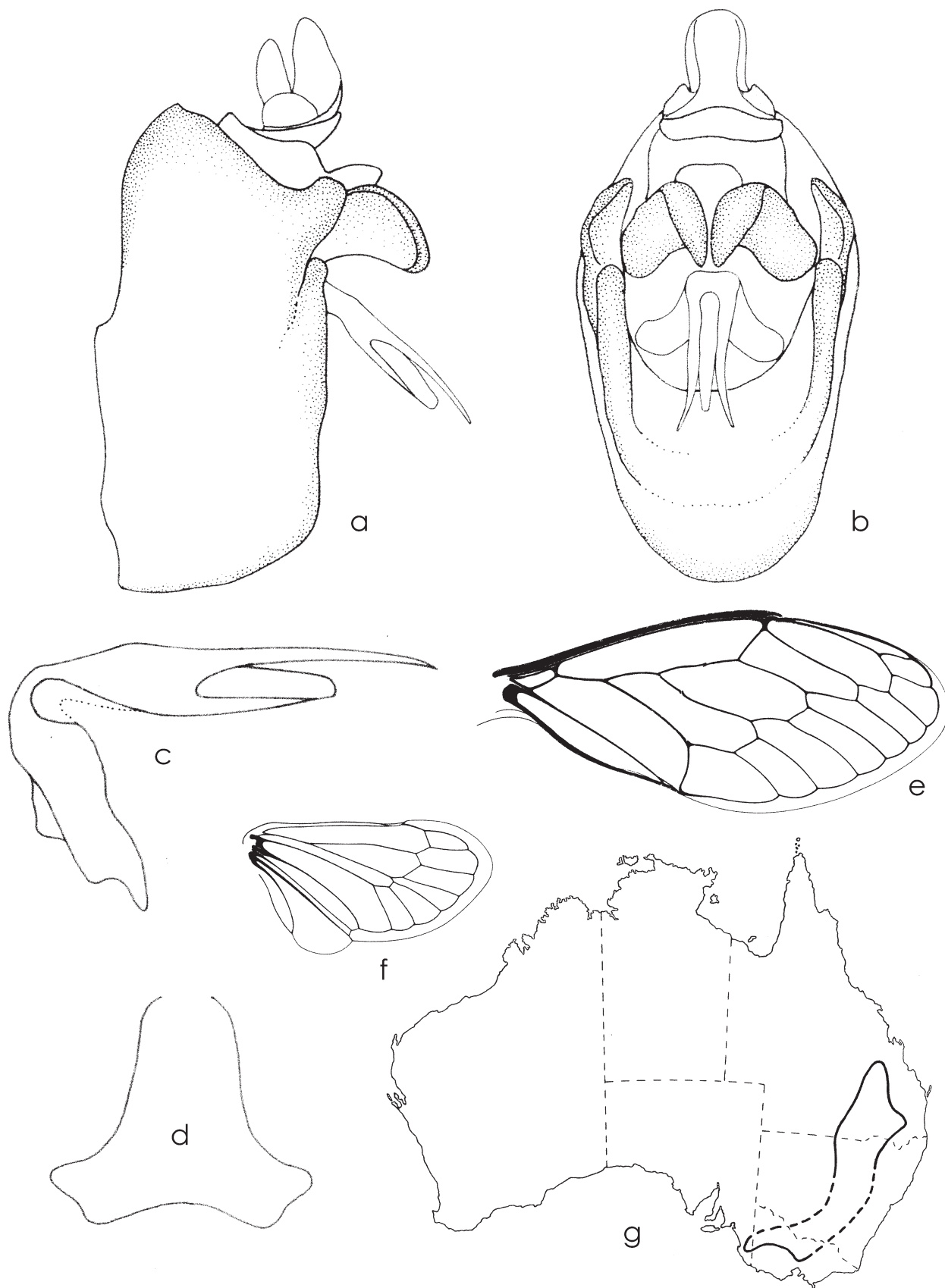
**Distribution** (Fig. 177g): Inland south-eastern Queensland from Edungalba (approximately 100 km SW of Rockhampton), through central New South Wales to central Victoria and from Lucindale in south-eastern South Australia.

**Diagnosis.** *Head* including eyes about as wide as or a little wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 177e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells mostly very much shorter than ulnar cells; radial cell very long (about equal to or longer than distance from its apex to wing tip); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 177f) with 5 or 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 177a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a very small, obtusely angular apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view parallel for much of their length then diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, no more than about half the length of pseudoparameres; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Very small cicadas, substantially black in colour (Pl. 2, fig. 8). Distinguished from all other genera by the following combination of characters: fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the fore wing radial cell is very long (about equal to or longer than the distance from its apex to wing tip) and the fore wings are short, wide and very rounded, about 2.4 x longer than wide.



**FIGURE 177.** Genus *Platypsalta* **gen. n.**: (a) *P. dubia* (Goding and Froggatt), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, male fore wing; (f) the same, male hind wing; (g) generic distribution.

The male genitalia have claspers that are essentially flat and wide in lateral view with an overhanging lip along the outer margin, the aedeagus has a typically 'trifid' theca exposing a fleshy endotheca, and the pygofer dorsal beak is very small, undeveloped and obtusely angular.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Further notes on *P. dubia*, including a song analysis, are provided by Ewart (1998a). The species treated as *P. mixta* in Moulds (1990) is not that species but an undescribed species in this genus.

### Genus *PLERAPSALTA* gen. n.

**Type species:** *Cicada multifascia* Walker, 1850 (Pl. 2, fig. 17).

**Included species:** AUSTRALIAN: *incipiens* (Walker, 1850), **comb. n.**; *multifascia* (Walker, 1850), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *plerus* meaning abundant and referring the large numbers that the species of this genus are sometime found, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 178f): South-eastern Queensland south from the Thangool district, central western Queensland as far west as Blackall and Charleville, through eastern New South Wales to Sydney and south-western New South Wales between Hay and Mildura.

**Diagnosis.** *Head* (Fig. 178e) including eyes about as wide as or a little wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax* (Fig. 178e): pronotum in dorsal view narrowing towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, usually no mid lateral tooth but present occasionally; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline, without infuscations; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells, 5 in aberrant specimens but usually only in one wing; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbal* covers absent; timbals with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases.

*Male genitalia* (Figs 178a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to

each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, no more than about half the length of pseudoparameres; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas, the two known species having a fore wing length under 18 mm; coloured black with orange markings (Pl. 2, fig. 17). Distinguished from all other genera by the following combination of characters: fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the pronotum narrows towards the posterior, the paranota are confluent with adjoining pronotal sclerites and usually without a mid lateral tooth but present in some specimens, and the posterior margin of the timbal cavity has a low ridge on its lower half.

The male genitalia have claspers that are essentially flat and wide in lateral view and distally parallel in ventral view, and the aedeagus has a typically 'trifid' theca exposing a fleshy endotheca.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution, habitat and biology of *P. incipiens* (as *Cicadetta murrayensis*) are provided by Moulds (1990). Ewart & Popple (2001) also provide notes on this species including an analysis of its song. Notes on seasonal occurrence and plant association of *P. multifascia* in western Sydney are provided by Emery *et al.* (2005).

## Review of species

### *Plerapsalta incipiens* (Walker), comb. n.

*Cicada incipiens* Walker, 1850: 189

*Pauropsalta incipiens* (Walker): Goding and Froggatt, 1904: 623

*Melampsalta incipiens* (Walker): Distant, 1906d: 175

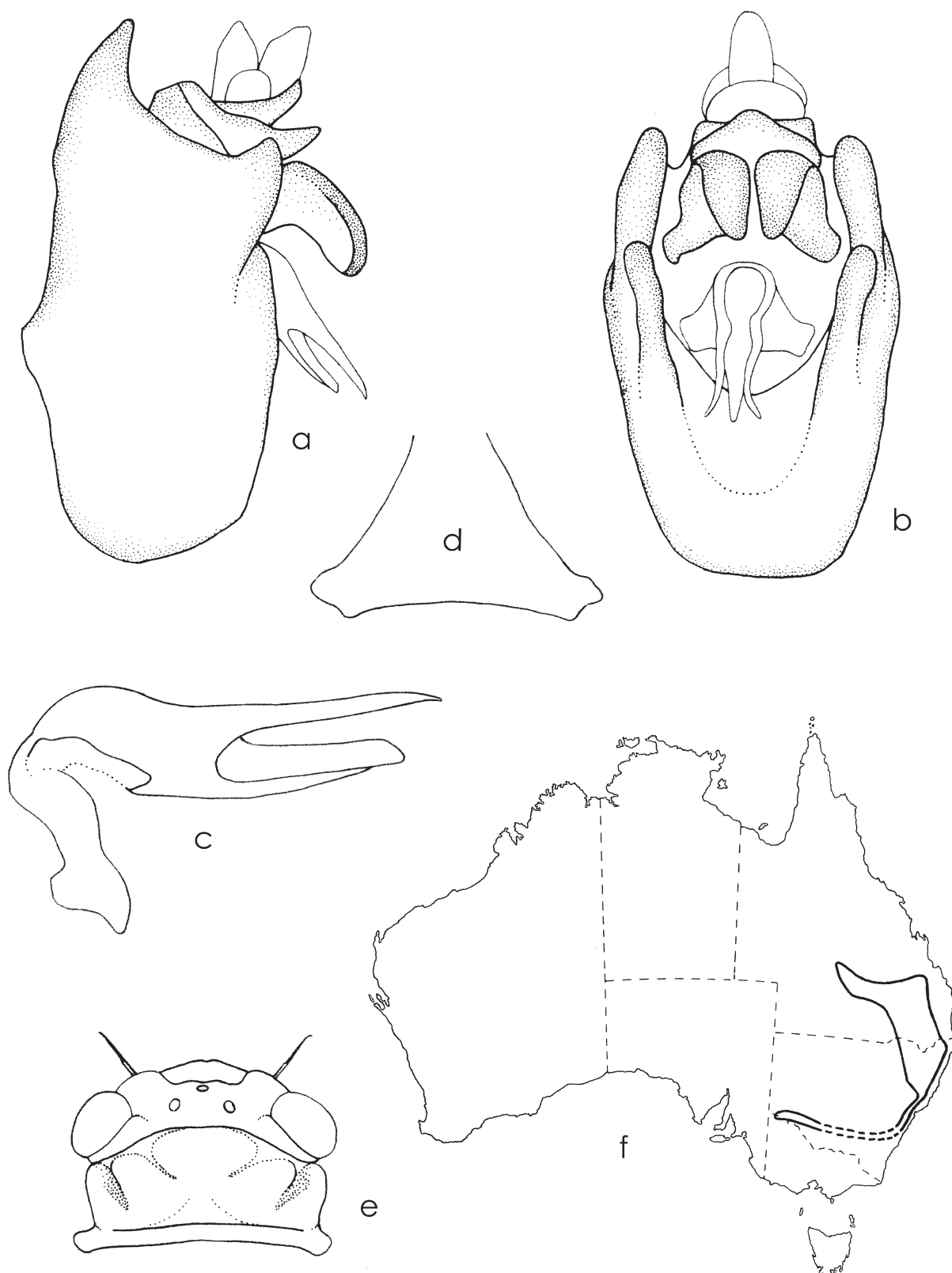
*Melampsalta murrayensis* Distant, 1907: 421. **Syn. n.**

*Cicadetta incipiens* (Walker): Duffels and van der Laan, 1985: 285

The syntypes of *murrayensis* (a male in BMNH and a male in ANIC with similar data) are conspecific with the female holotype of *incipiens* (in BMNH).

Ashton (1912b) was wrong in treating *Melampsalta abbreviata* Goding and Froggatt, 1904, as a different taxon from *Cicada abbreviata* Walker, 1862, on the basis of Goding and Froggatt determinations in MM and MV and then including the former in the synonymy of *incipiens*. The description of *abbreviata* by Goding and Froggatt is an exact paraphrase of Walker's original description of *abbreviata* and was obviously intended for Walker's species; further, Goding and Froggatt state that they had not previously seen this species (Goding and Froggatt 1904: 562).

**Distribution.** Moulds (1990) recorded this species from Hay and near Mildura, New South Wales. Ewart & Popple (2001) recorded it from Blackall and Charleville in the central west of Queensland. It is now known to occur widely through inland areas of south-eastern Queensland including the Thangool district (R. Eastwood), Augathella (Hill, Marshall and Moulds), Windorah (G.B. Monteith), and near Muckadilla (A.J. Emmott), and through New South Wales along the Western Slopes of the Great Dividing Range to Tamworth (L.R. Greenup). The type locality of *murrayensis* is Victoria and NW Murray River while that of *incipiens* is Adelaide but there are no confirmed records from the latter.



**FIGURE 178.** Genus *Plerapsalta* **gen. n.**: (a) *P. multifascia* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, head and pronotum, dorsal view; (f) generic distribution.



***Plerapsalta multifascia* (Walker), comb. n.**

(Pl. 2, fig. 17)

*Cicada multifascia* Walker, 1850: 185

*Cicada singula* Walker, 1850: 186

*Cicada obscurior* Walker, 1850: 187

*Melampsalta multifascia* (Walker): Stål, 1862a: 484

*Pauropsalta multifascia* (Walker): Goding and Froggatt, 1904: 625

*Melampsalta singula* (Walker): Distant, 1906d: 175

*Cicadetta multifascia* (Walker): Kirkaldy, 1907b: 308

*Cicadetta singula* (Walker): Metcalf, 1963: 381

Stål (1862a) placed *singula* as a junior synonym of *multifascia*. Distant (1906d) reinstated *singula* to specific rank and subsequent authors followed that decision. Burns (1957) erroneously considered *multifascia* Walker to be a different taxon from *multifascia* Stål but I can find no evidence supporting such a decision.

I have examined the holotype female of *Cicada singula* (in BMNH) and the male holotype of *C. obscurior* (in BMNH); comparisons with material in my collection show that they are conspecific. The type of *C. multifascia* appears to be lost but accepting the synonymy of *C. obscurior* and *C. multifascia* of Stål (1862a) which has never been disputed, it follows that *C. multifascia*, *C. obscurior* and *C. singula* are synonymous. I therefore return *C. singula* to junior synonymy of *C. multifascia* as originally proposed by Stål (1862a).

Following the principle of first reviser (see *Code*, Article 24), the name *multifascia* takes priority following the choice of Stål (1862a).

Nothing has been published on the identity of this species since its original description by Walker in 1850. It is similar in size and general pigmentation to *P. incipiens* (figured in Moulds 1990, Pl. 17, figs 5, 5a, under its synonymic name *Cicadetta murrayensis*) but it can be distinguished from that species by having reduced orange colouring on the abdomen in both sexes; on *P. incipiens* the orange dominates the abdomen whereas on *P. multifascia* the abdomen is dark with the orange confined to the distal margins of the sclerites only.

**Distribution.** The limited number of available records show the distribution to extend from Toowoomba and Canungra (A. Ewart) in south-eastern Queensland and in New South Wales along the eastern foothills of the Great Dividing Range through Kyogle, the foothills of Barrington Tops to western Sydney.

**Genus *PSALTODA* Stål**

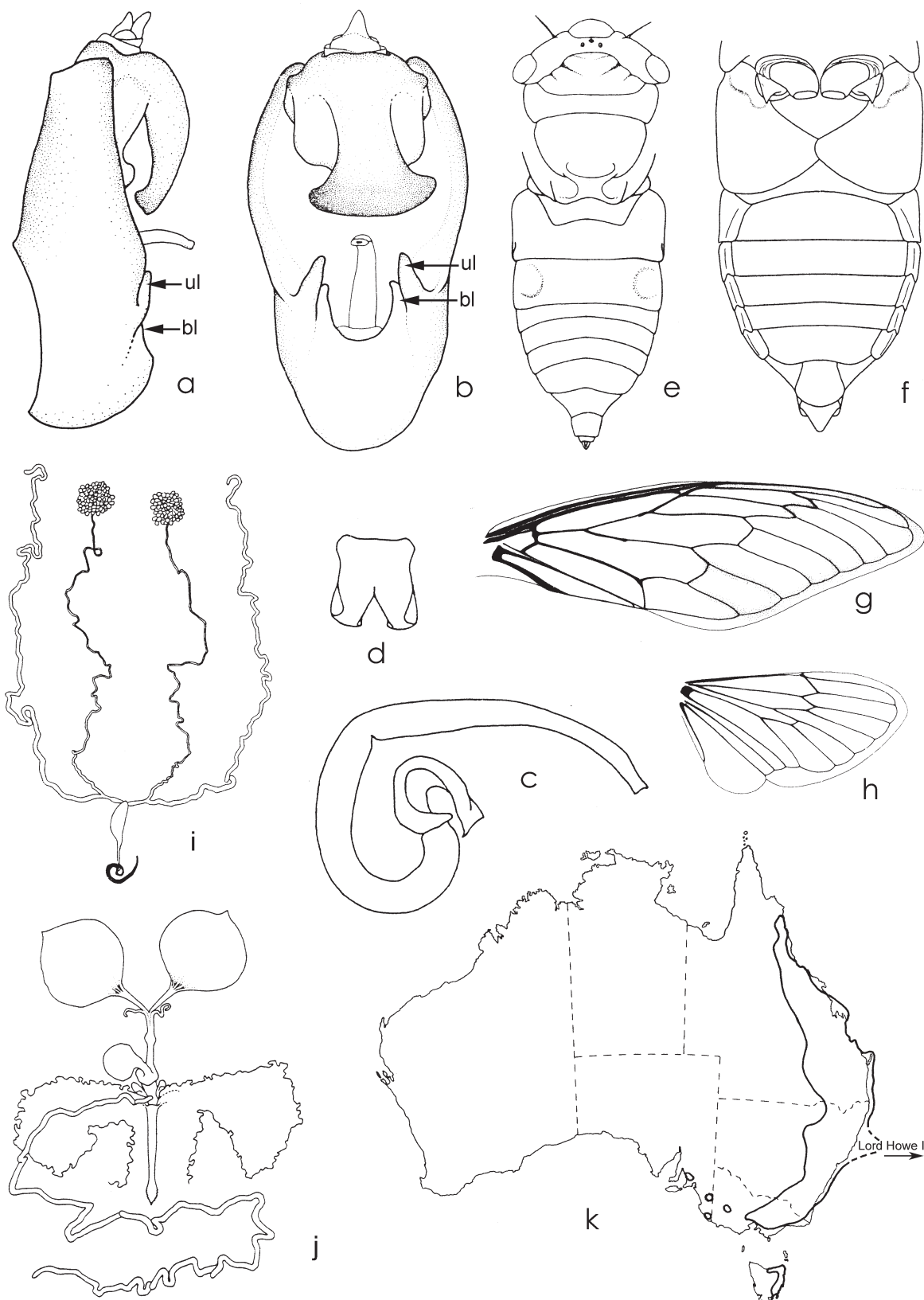
*Psaltoda* Stål, 1861: 613; Stål, 1862a: 483; Stål, 1866a: 6; Marschall, 1873: 378; Distant, 1882: 125; Atkinson, 1886: 178; Karsch, 1890a: 86, 106; Kirby, 1896: 458; Horváth, 1900: 641; Distant, 1904a: 302, 303; Goding and Froggatt, 1904: 564, 567, 584; Jacobi, 1905: 432; Distant, 1906d: 27, 28; Froggatt, 1907: 349; Distant, 1910: 415; Ashton, 1912b: 23; Distant, 1912a: 22; Ashton, 1914a: 346; Ashton, 1914b: 13; Ashton, 1921: 92, 96; Handlirsch, 1925: 1117; Singh-Pruthi, 1925: 190; Schulze, Kükenthal and Heider, 1926–40: 2877; Kato, 1932: 9, 153; Neave, 1940a: 951; Cooper 1941: 295; Metcalf, 1944: 154; Metcalf, 1947: 163; Kato, 1956: 66, 79; Burns, 1957: 615; Metcalf, 1963: 149; Boulard, 1965: 803; Young, 1973: 378; Popov, 1975a: 34; Popov, 1975b: 288; Moulds, 1984: 27, 30–32; Duffels and van der Laan, 1985: 52; Moulds, 1990: 74; Moss and Moulds, 2000: 47; Moulds, 2002: 325–326; Moulds, 2005a: 377, 387–391, 412, 413, 430, 431.

**Type species:** *Cicada moerens* Germar, 1834, by subsequent designation by Distant, 1904a: 303.

**Included species:** AUSTRALIAN: *adonis* Ashton, 1914; *antennetta* Moulds, 2002; *aurora* Distant, 1881; *brachypennis* Moss and Moulds, 2000; *claripennis* Ashton, 1921; *flavescens* Distant, 1892; *fumipennis* Ashton, 1912; *harrisii* (Leach, 1814); *insularis* Ashton, 1914; *maccallumi* Moulds, 2002; *magnifica* Moulds, 1984; *moerens* (Germar, 1834); *mossi*, Moulds, 2002; *pictibasis* (Walker, 1858); *plaga* (Walker, 1850). OTHERS: none.

**Distribution** (Fig. 179k): Eastern Australia, both coastal and inland, from near Cooktown in north-eastern Queensland through NSW, the ACT and Victoria to Adelaide in South Australia and in Tasmania (Moulds 1990, Haywood 2006a).

**Diagnosis.** *Head* (Fig. 179e) including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 179e): pronotal collar width at dorsal midline broad, equal to about diameter of eyes or a little greater; paranota strongly ampliate, evenly rounded, sloping



**FIGURE 179.** Genus *Psaltoda* Stål: (a) *P. moerens* (Germar), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, male head and body, dorsal view; (f) underside of male body showing opercula; (g) the same, fore wing; (h) the same, hind wing; (i) male reproductive system, dissection with aedeagus removed from pygofer, (j) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (k) generic distribution. *ul* upper lobe, *bl* basal lobe.

forwards in lateral view; no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* (Fig. 179g) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation overlaying veins on some species only, overlaying some or all veins at bases of apical cells 2–7, also sometimes at extremities of longitudinal veins near ambient vein; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 179h) with 6 apical cells; in some species infuscation along much of ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 179f) covering rim of distal margin of tympanal cavity, reaching to or just passing level of distal margin of tergite 2, very long and straight along lateral margin which is strongly upturned; overlapping; meeting or overlapping timbal covers. *Male abdomen* (Figs 179e, f) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2 and 3 enlarged, accounting for approximately half abdominal length; sternites IV–VII in cross-section entirely flat. *Timbal* covers present, flat, fully rounded dorsally and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 179a–d). Pygofer with distal shoulders broad, rounded, the most distal part of pygofer; upper lobes thickened, well developed; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe finger-like with very broad apex, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90° or more; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft recurved basally through 180° or more, J shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 179i) with accessory glands long.

*Female reproductive system* (Fig. 179j) ditrysian; accessory glands of common oviduct short, no longer than common oviduct.

**Distinguishing characters.** Medium to large cicadas. Distinguished from most other Australian genera by the broad head (clearly wider than mesonotum), in conjunction with a broad pronotal collar with strongly ampliate lateral margins and very flat male sternites IV–VII. *Psaltoda* differs from *Neopsaltoda* in having abdominal tergites 2 and 3 in the males accounting for no more than half the length of the abdomen while in *Neopsaltoda* tergites 2 and 3 clearly account for more than half. *Psaltoda* differs from *Anapsaltoda* by having the fore wing anal lobes hyaline rather than completely suffused bright orange and the supra-antennal plates not curved under the head so that when viewed ventrally their rims are aligned with the anterior margin of the vertex.

The male genitalia have a distinctive uncal lobe which, in dorsal view is broad with an expanded broad apex (Fig. 179b), and restraint of the aedeagus by fleshy sinuation prior to the ventral surface of the uncus, characters shared only with *Anapsaltoda* and *Neopsaltoda*. The pygofer is narrow in lateral view.

**Discussion.** Most species in this genus are morphologically very similar but two possess notable autapomorphies; *P. antennetta* has antennae with foliate distal segments while *P. adonis* has much expanded male opercula that cover a substantial proportion of the timbal covers.

Phylogenetic relationships of this genus are shown in the cladistic analysis of Moulds (2005a) based on the type species *P. moerens*. Phylogenetic relationships within the genus are discussed in Moulds (2002). Moulds (1990) provides notes on the distribution and biology of many of the species in this genus. Analyses of songs and calling behaviour can be found in Bennet-Clark & Young (1994), Emery *et al.* (2005), Ewart (1995, 2001b), Moss & Moulds (2000) and Young & Josephson (1983). Further notes on the species of this genus are provided by Bashford (1997), Burwell (1991), Coombs (1996), Dunn (1998), Ewart (2001a), Faithfull (2010), Moss (1989), Moss and Moulds (2000), Moulds (2002), Popple & Strange (2002), Steinbauer (1997).

## Genus *PUNIA* gen. n.

**Type species:** *Pauropsalta minima* Goding and Froggatt, 1904.

**Included species:** AUSTRALIAN: *minima* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

**Etymology.** Derived from the Anglo-Saxon 'puny' and referring to the small size of the species in this genus, amongst the smallest cicadas known. Feminine.

**Distribution** (Fig. 180h): The far northeast of Western Australia from near Wyndam to Kununurra, the Top End of the Northern Territory south to Mataranka, and Cape York Peninsula in northern Queensland between Iron Range and Mt Garnet (Moulds, 1990). This distribution includes some undescribed species and the true distribution of *P. minima* is more confined (Moulds, in prep).

**Diagnosis.** *Head* (Fig. 180e) including eyes wide, clearly wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 180f) hyaline; infuscation absent or as weak suffusion on apical veins; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; radial cell very long (longer than distance from its apex to wing tip); basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma present; vein CuA straight or only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 180g) with 5 apical cells (sometimes 6 or 4 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); tergites 3–6 (plus 7 in some species) lightly sclerotised and translucent; sternites III–VII in cross-section convex. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.

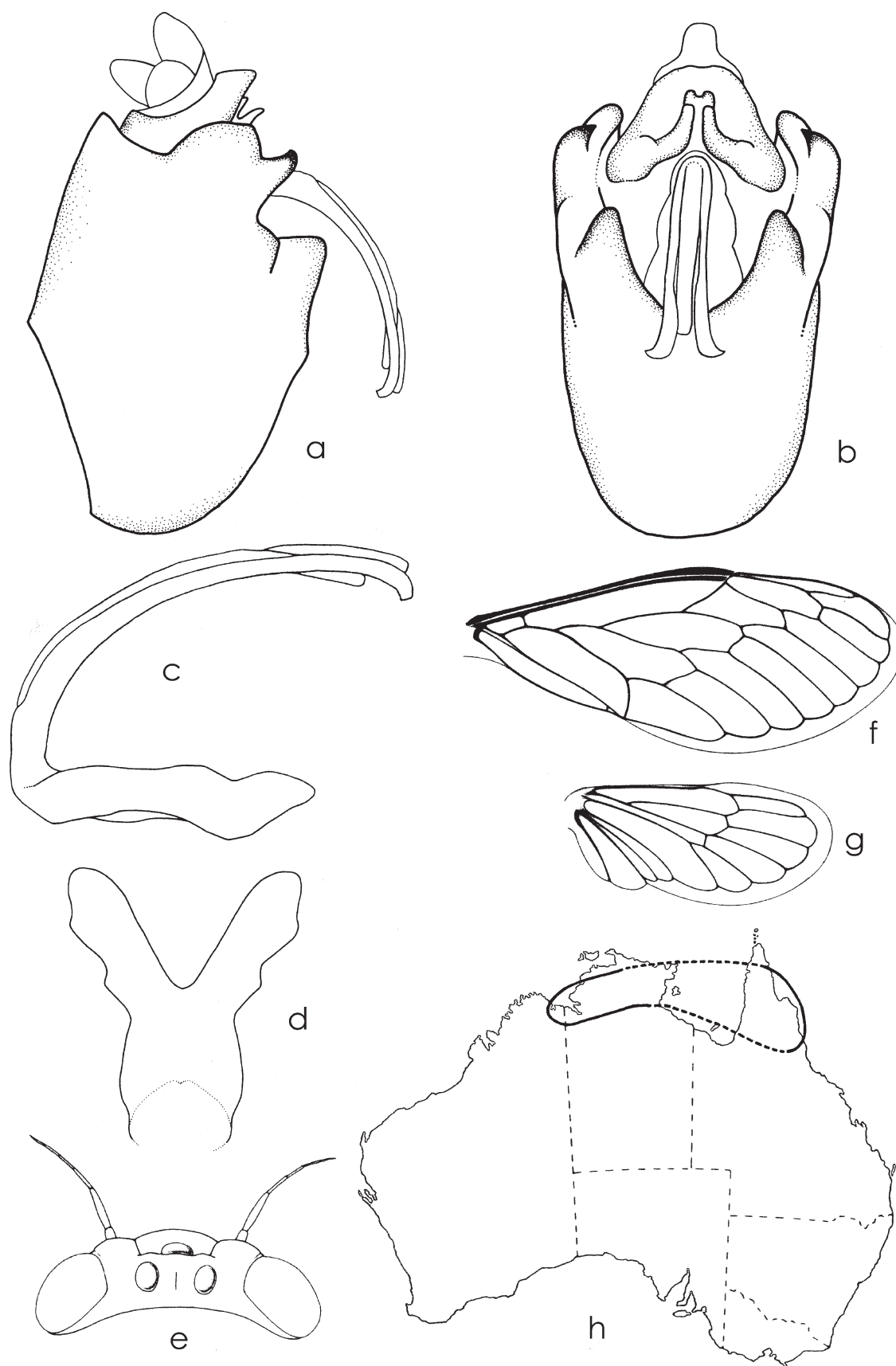
*Male genitalia* (Figs 180a–d). Pygofer with distal shoulders not developed; upper lobes flat, moderately developed with accessory 'tooth'; basal lobes undivided, large, in lateral view projecting outwards, basically triangular but sometimes distally elongate; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view Y-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate with a functional 'hinge', small, substantially compressed between theca and basal plate in lateral view; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; endotheca exposed, ridged, in part or entirely chitinized; endothecal ventral support absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Very small cicadas. The head is clearly wider than the mesonotum, the fore wing costa is clearly broadest a little before the node, the fore wing radial cell is very long (longer than the distance from its apex to the wing tip), there are 5 hind wing apical cells (sometimes 4 or 6 if aberrant, but usually only in one wing) and no hind wing infuscation. These characters distinguish *Punia* from all other genera except *Neopunia*.

Distinguished from *Neopunia* by the length of the fore wing radial cell; that of *Neopunia* is shorter than the distance from its apex to wing tip. Males of *Punia* have a very characteristic abdomen on which tergites 3–6 (and for some undescribed species, also 7) are translucent; those of *Neopunia* are never translucent.

The male genitalia have distinctive upper pygofer lobes that are moderately developed, bifurcate with the lower appendage tooth-like and sharply pointed. The aedeagus possesses pseudoparameres that are very long, reaching to near the distal end of the theca and the basal plate is Y-shaped. In all these characters the male genitalia are similar to those of *Neopunia* and *Nanopsalta*.



**FIGURE 180.** Genus *Punia* gen.n.: (a) *P. minima*, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) generic distribution.



**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis of Moulds (2005a) based on the type species *P. minima*. Notes on the distribution and biology of the single described species in this genus have been provided by Moulds (1990).

### Genus *PYROPSALTA* gen. n.

**Type species:** *Cicada melete* Walker, 1850.

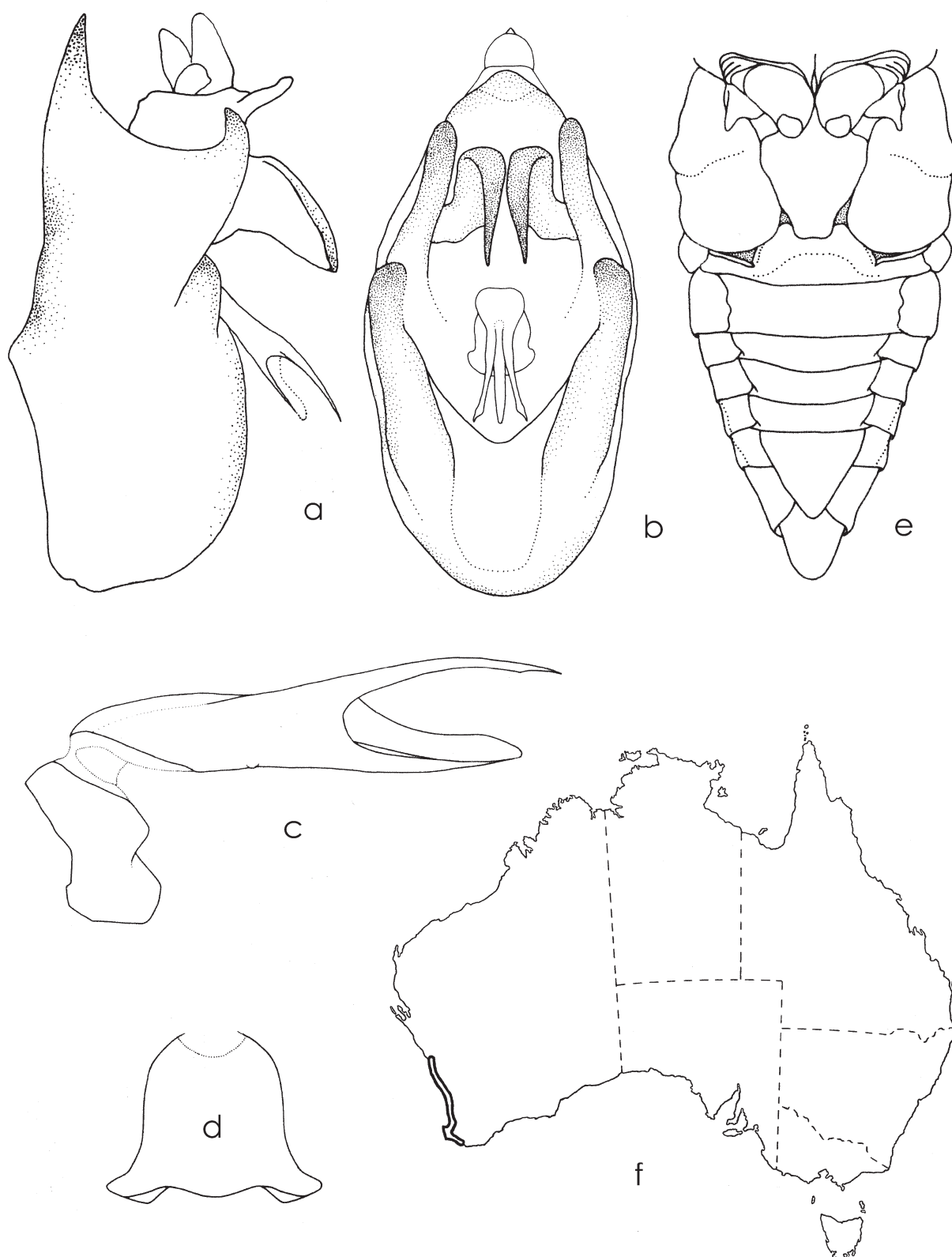
**Included species:** AUSTRALIAN: *melete* (Walker, 1850), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *pyropos* meaning fiery or fiery-red and referring to the fiery-red markings on the type species, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 181f): South-western Western Australia south from Dongara to Windy Harbour.

**Diagnosis.** *Head* including eyes about as wide as or wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax:* pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota weakly ampliate, with a mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 181e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting; base (remnant of epimeron 3) much swollen and bubble-like. *Male abdomen* (fig. 181e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 wide and swollen around dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome very large; anterior part of timbal largely free of ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 181a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, in lateral view distally turned upwards and somewhat hook-like; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, wide in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that is entirely fleshy; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view wide apart and diverging throughout their length, in lateral view directed



**FIGURE 181.** Genus *Pyropsalta* **gen. n.:** (a) *P. melete* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, underside of male body showing opercula; (f) generic distribution.

upwards compared to thecal shaft with proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Distinguished by the following combination of characters: fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the paranota are ampliate with a mid lateral tooth, the distance between fore wing crossveins r and r-m is much less than the distance between r-m and m, and the anterior part of the male timbals is largely free of ribs.

The male genitalia have an aedeagus with a theca that is typically 'trifid' possessing an exposed fleshy endotheca, with pseudoparameres that are wide apart and diverging throughout their length, and claspers that are essentially flat and wide in lateral view and distally parallel in ventral view.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the synonymy, distribution, biology and song of *P. melete* are provided by Gwynne *et al.* (1988) and Moulds (1990). Notes on the calling behaviour and song of an undescribed species can be found in Gwynne *et al.* (1988).

### Genus *QUINTILIA* Stål

**Type species:** *Cicada rufiventris* Walker, 1850, by subsequent designation by Distant 1905f.

**Included species:** AUSTRALIAN: none. OTHERS: Some 20 species, all from Africa.

**Excluded species:** *infans* (Walker, 1850), transferred to *Terepsalta* **gen. n.**, *q.v.*

**Distinguishing characters.** Small cicadas. The genus has been ill-defined. Examination of the type species and one other (possibly *Q. conspersa* Karsch) revealed the following notable characters. Fore wing vein R+Sc is swollen so that the costal vein (C) is lower than R+Sc; male timbal covers are absent; the aedeagus lacks pseudoparameres and a basal hinge. No Australian species fulfils this combination of attributes.

**Discussion.** The placement of *infans* in *Quintilia* is clearly erroneous when male genitalic characters are considered. When Distant (1906d) transferred *infans* to *Quintilia* he gave no reason for doing so apart from the implied characters listed in his key to genera. These include only wing and head characters that occur widely throughout the Cicadidae. With the removal of *infans*, *Quintilia* is no longer represented in Australia and will not be considered further.

### Genus *SAMAECICADA* Popple and Emery

*Samaecicada* Popple and Emery 2010: 147–156.

**Type species:** *Pauropsalta subolivacea* Ashton, 1912, by original designation (Pl. 2, fig. 14).

**Included species:** AUSTRALIAN: *subolivacea* (Ashton, 1912). OTHERS: none.

**Distribution** (Fig. 182e): Known only from New South Wales in the vicinity of Sydney.

**Diagnosis.** *Head* including eyes about as wide as or wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax:* pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; dome of cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline, without infuscations; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that

proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m shorter than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell a little longer than the distance from its apex to wing tip; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells (5 or 7 if aberrant); apical cell 1 very small; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe tending narrow with vein 3A curved, about half the length of anal lobe, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, clearly not developed around meracanthus, apically broadly rounded, meeting but not overlapping. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex, tending swollen so that all are partly visible in lateral profile. *Timbals* with 2 or three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 182a–d). Pygofer in ventral view ovoid to sub ovoid in shape, tending slender with upper pygofer lobes aligned with sides of pygofer; pygofer with distal shoulders not developed; upper lobes well developed, long and slender and gradually tapering to a blunt point, set well away from dorsal beak; basal lobes absent; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus reduced to a very small chitinous patch without length, effectively absent. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, narrow in lateral view, strongly arched with sweeping upturned distal end; fused for a short distance proximal to upturned end; distally parallel to each other. Aedeagus with basal plate in lateral view arched, weakly depressed on dorsal midline, in dorsal view longer than broad, T-shaped, basal portion of basal plate directed forwards away from thecal shaft, ventral rib ridge-like and completely fused with basal plate; junction between theca and basal plate ridged, without a 'hinge'; thecal shaft slender and almost filiform, curved in a sweeping arc; pseudoparameres absent; endotheca concealed; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening subapical on theca. *Male reproductive system* unknown. *Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

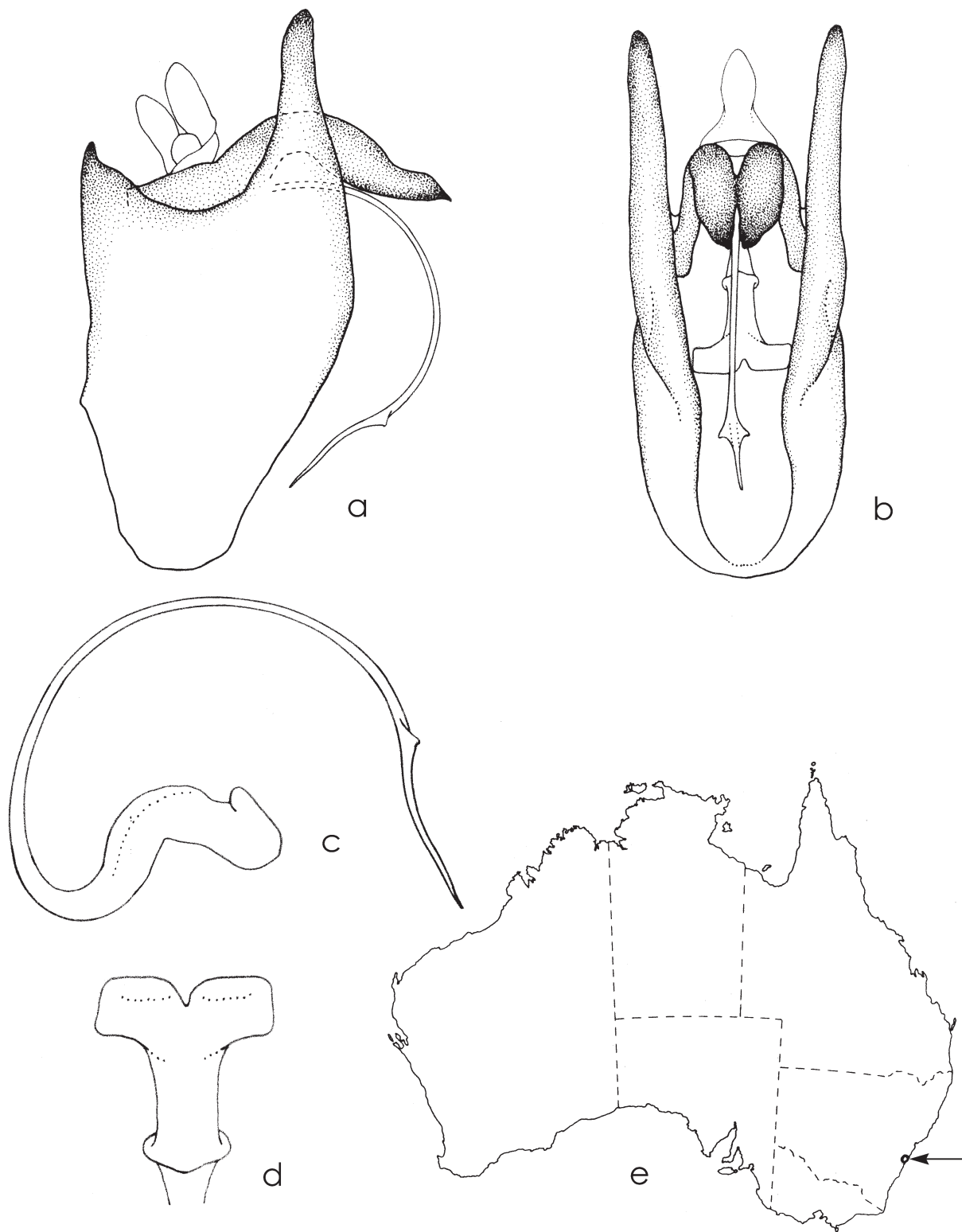
**Distinguishing characters.** Small cicadas. Distinguished from most other genera by having fore wing veins M and CuA with their stems completely fused as one, no fore or hind wing infuscations, fore wing apical cells 2–7 mostly similar in length to the ulnar cells, and hind wing apical cell 1 very small.

The male genitalia are very distinctive; the pygofer basal lobes are absent, the upper lobes are very long, the uncus is so reduced as to be effectively absent, and the gracile aedeagus lacks pseudoparameres and a flexible junction between the theca and basal plate.

Within the Australian fauna, the general appearance of *Samaecicada* (Pl. 2, fig. 14) is similar to species of *Taurella* as noted by Popple and Emery (2010). The very small hind wing apical cell 1 clearly separates *Samaecicada* from *Taurella* and the males of *Taurella* also differ in having well developed basal lobes to the pygofer and eight long timbal ribs.

**Discussion.** Popple and Emery (2010) provide notes on the identity, distribution, habitat and behaviour of *S. subolivacea*, the only species in the genus.

The features of the male genitalia highlighted above under Distinguishing Characters suggest that *S. subolivacea* is highly derived. The well developed claspers and basal fusion of fore wing veins M and CuA are the only attributes pointing to the placement of *Samaecicada* in the tribe Cicadettini. The absence of pseudoparameres is remarkable and suggests that *Samaecicada* may in fact not belong to the Cicadettini although it appears best retained there at this time. Popple and Emery suggested that *Samaecicada* may be allied to *Nigripsalta* de Boer from New Guinea and *Fijipsalta* Duffels from Fiji based on similarities in the theca and upper pygofer lobes, and the absence of basal lobes in *Fijipsalta*. There may well be some association with these genera but unlike *Samaecicada* both *Nigripsalta* and *Fijipsalta* have well developed pseudoparameres suggesting that the association is not close.



**FIGURE 182.** Genus *Samaecicada* Popple and Emery: (a) *S. subolivacea* (Ashton), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution.



## Genus *SIMONA* gen. n.

**Type species:** *Melampsalta sancta* Distant, 1913 (Pl. 1, fig. 11).

**Included species:** AUSTRALIAN: *sancta* (Distant, 1913), **comb. n.** OTHERS: none.

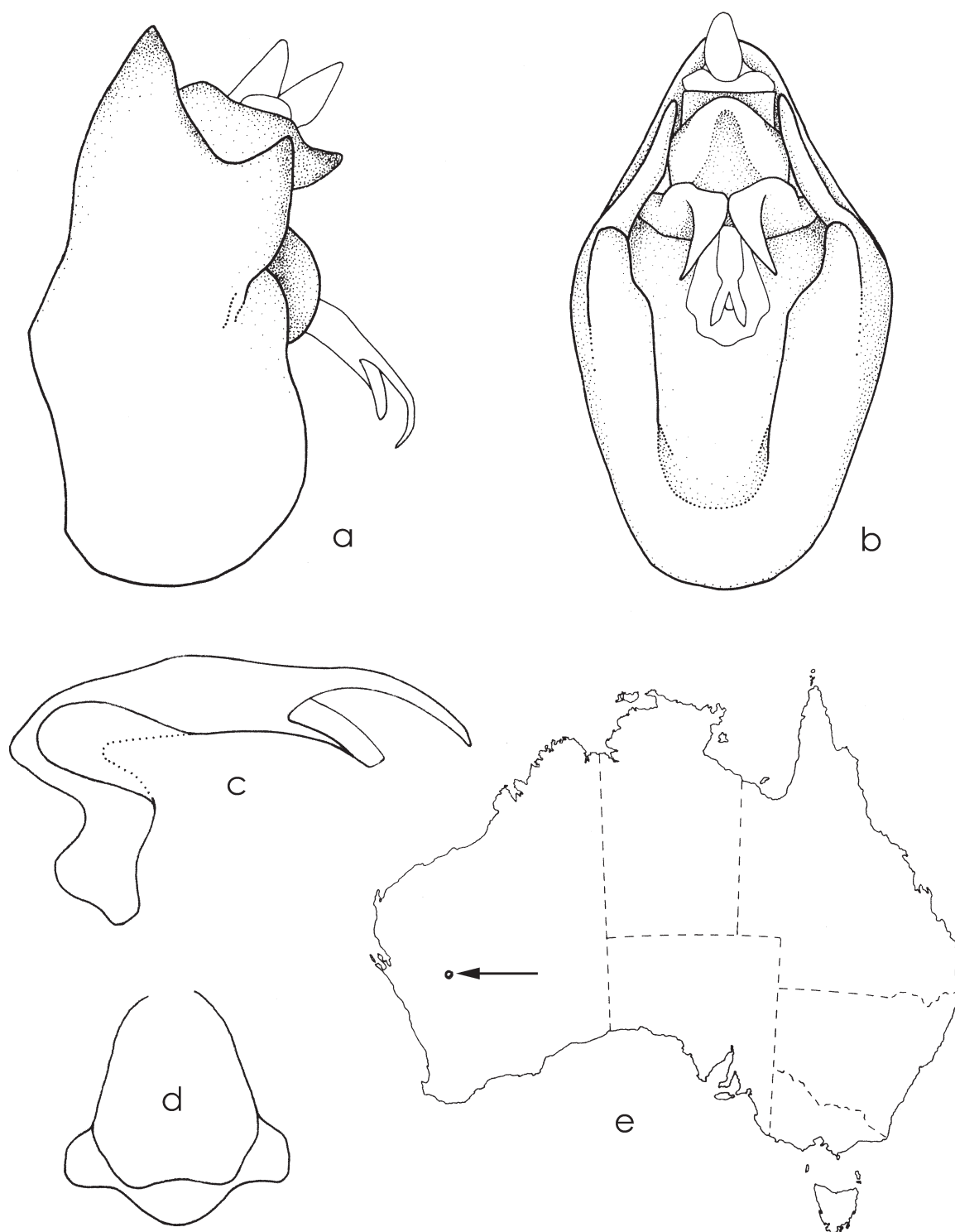
**Etymology.** Named in honour of Prof. Chris Simon in recognition of her dedication in pursuing knowledge on cicadas, not only through her own publications but also through her unerring support of other people's work.

**Distribution** (Fig. 183e): Known only from Cue in Western Australia.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 wide, much wider along dorsal midline than any one of tergites 3–7; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with 3 long ribs spanning the full height of the timbal (and 1 or 2 not so long, and spaced with prominent intermediate short ribs; basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 183a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; claw-like with minimal cavity ventrally; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of their length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length (no more than about half the length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.



**FIGURE 183.** Genus *Simona* gen. n.: (a) *S. sancta* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) generic distribution.

**Distinguishing characters.** Small cicadas. Distinguished from all other genera by having the combination of fore wings with veins M and CuA meeting the basal cell with their stems completely fused as one, hind wings with 6 apical cells, paranota confluent with adjoining pronotal sclerites and lacking a mid lateral tooth, and a pronotum that widens towards the posterior. The male genitalia have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, and claspers that are claw-like with diverging distal ends.

Distinguished from the closely allied *Chelapsalta puer* by the shape of the pronotum that widens towards the posterior. Further, the male of *S. sancta* (Pl. 1, fig. 11) has abdominal segment 2, where it forms the posterior margin of the timbal cavity, very angular; that of *C. puer* is very rounded.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper.

*Simona sancta* is very similar morphologically to *Chelapsalta puer*, the most notable difference being the shape of the pronotum; that of *S. sancta* widens towards the posterior, that of *C. puer* narrows towards the posterior. Molecular studies by Hill, Marshall, Simon, *et al.* (pers. comm.) support the generic separation of these two species because at least one other well-defined genus separates them phylogenetically. It is for this reason that I place them here in separate genera.

## Review of selected species

### *Simona sancta* (Distant), comb. n.

(Pl. 1, fig. 11)

*Melampsalta sancta* Distant, 1913a: 490

*Melampsalta subglusa* [sic] Ashton, 1914a: 354 [misspelling]. **Syn. n.**

*Melampsalta subgulosa* (Ashton): Ashton, 1915: 91 [corrected spelling]

*Cicadetta sancta* (Distant): Duffels and van der Laan, 1985: 291

*Cicadetta subgulosa* (Ashton): Duffels and van der Laan, 1985: 292

The female holotype of *sancta* (in BMNH) is conspecific with the male holotype of *subgulosa* (in SAM).

### Genus *SYLPHOIDES* gen. n.

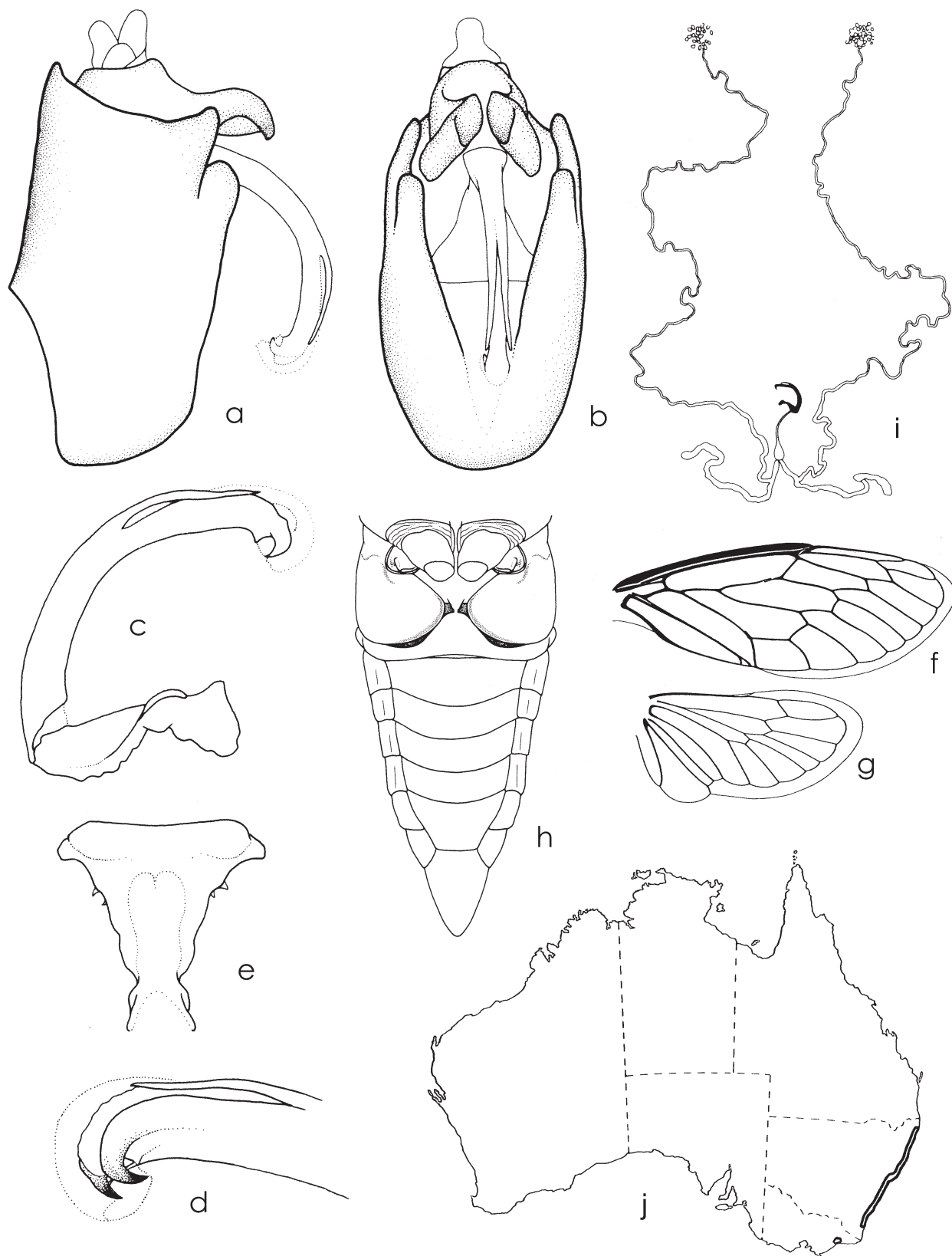
**Type species:** *Melampsalta arenaria* Distant, 1907.

**Included species:** AUSTRALIA: *arenaria* (Distant, 1907), **comb. n.** OTHERS: none.

**Etymology.** From the French *sylphe*, and meaning a fairylike spirit of the air. Feminine.

**Distribution** (Fig. 184j): Coastal New South Wales, always in the vicinity of beach sand dunes (Moulds 1990) and in Victoria from Lakes Entrance (Dunn 1991).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 184f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one (usually so; abutted on some individuals); vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 184g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male hind leg* meracanthus characteristically rudimentary and not developed into a flat spine. *Male opercula* (Fig. 184h) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* (Fig. 184h) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.



**FIGURE 184.** Genus *Sylphoides* **gen. n.**: (a) *S. arenaria* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, apex of aedeagus dorsolateral view; (e) the same, basal plate, dorsal view, apex at top; (f) the same, fore wing; (g) the same, hind wing; (h) the same, underside of male body showing opercula; (i) male reproductive system, dissection with aedeagus removed from pygofer; (j) generic distribution.

*Male genitalia* (Figs 184a–e). Pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that is large and highly visible in lateral view; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating distal of thecal base; endothecal ventral support absent; thecal apex partly chitinized; thecal subapical cerci absent; flabellum absent; conjunctival claws absent but nevertheless with a pair of characteristic claw-like appendages apically on theca; vesica retractable, vesical opening apical on theca; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 184i) accessory glands short.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. The head including eyes is about equal in width to the pronotum; fore wing veins M and CuA meet the basal cell either with their stems fused or abutted; fore wing infuscations are absent; the hind wing has 6 apical cells and there is no infuscation at the distal end of hind wing vein 2A.

The above characteristics distinguish *Sylphoides* from all other Australian genera except *Birrima*, *Notopsalta*, *Kobonga*, *Kikihia* and *Yoyetta*. Males of *Sylphoides* clearly differ in their distinctive aedeagus which has a pair of pseudoparameres dorsal on the theca and two claw-like appendages at the thecal apex. Females differ from *Notopsalta* and *Birrima* in having the ovipositor sheath extending clearly beyond the level of abdominal segment 9 but far less than half the length of the dorsal midline of abdominal segment 9. They differ from *Kobonga* in having fore wing apical cells more or less similar in length to the ulnar cells instead of very much shorter. Females are structurally similar to those of *Kikihia* and *Yoyetta*.

**Discussion.** Notes on the distribution, habitat and biology of this species are provided by Moulds (1990).

### Genus *TALCOPSALTRIA* Moulds

*Talcopsaltria* Moulds 2008: 209–212.

**Type species:** *Talcopsaltria olivei* Moulds, 2008, by original designation (Pl. 1, fig. 2).

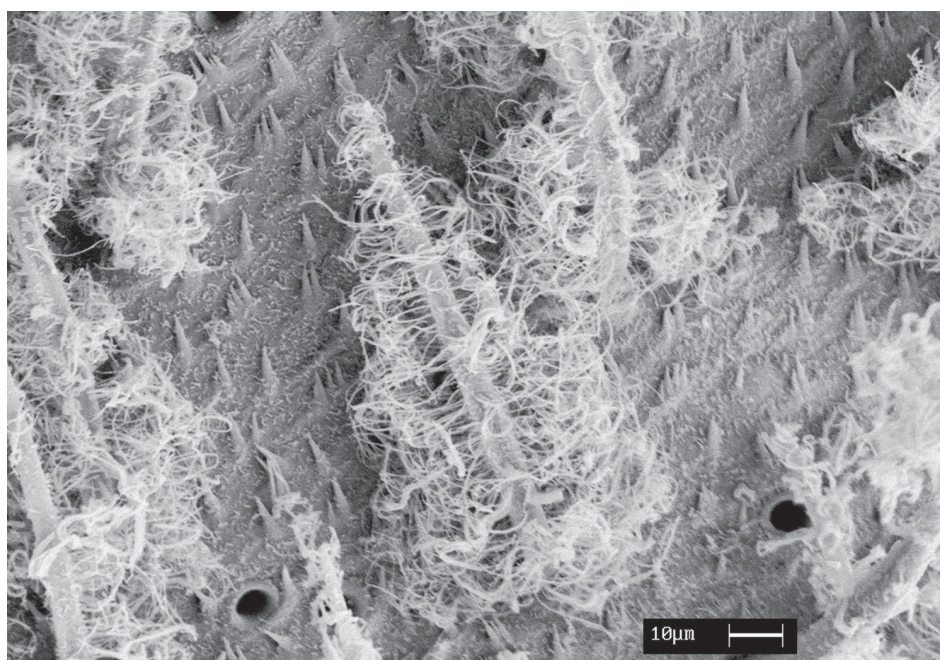
**Included species:** AUSTRALIAN: *olivei* Moulds, 2008. OTHERS: none.

**Distribution** (Fig. 186i): Cape York Peninsula, Queensland, south from Heathlands, through the Coen and Laura districts to Archer Point near Cooktown (Moulds 2008b).

**Diagnosis.** *Head* including eyes wider than mesonotum but clearly narrower than lateral angles of pronotal collar; postclypeus in lateral profile rounded between 'top' and 'sides', midline clearly depressed. *Thorax:* pronotal collar width at dorsal midline moderately broad, but less than diameter of eyes; lateral margins weakly ampliate, no mid lateral tooth but edged with many microscopic spine-like bristles; cruciform elevation with dome wider than long; epimeral lobe reaching operculum. *Fore wings* (Fig. 186e) hyaline; with 8 apical cells; infuscation overlaying distal end of vein CuP+1A and adjacent portion of 2A+3A; subapical cells absent; ulnar cell 3 angled to radial cell; vein CuA only weakly bowed so that cubital cell no larger than medial cell; costal vein (C) no higher than R+Sc; costa reducing to node; pterostigma present; veins M and CuA widely separated at basal cell making basal cell broad and tending to be rounded; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; veins CuP and 1A fused in part; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 186f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end shorter than that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine lying flat, prostrate. *Male hind leg* meracanthus with spur slender, triangular. *Male opercula* (Fig. 186g) completely encapsulating meracanthus, covering tympanal cavity but not meeting. *Male abdomen* (Figs 186g, h) shorter than head plus thorax (that of female longer); abdominal tergites with their sides weakly convex in cross-section, not partly concave; tergites 2 and 3 larger than tergites 4–7; sternites III–VII gently convex in cross-section. *Timbal* covers (Fig. 186h) small, covering no more than half timbal cavity;



timbals (Fig. 186h) with large basal dome, the type species with four long ribs spaced with prominent intermediate short ribs.



**FIGURE 185.** *Talcopsaltria olivei* Moulds: setae on male operculum showing secretion of wax filaments. These wax secretions cover much of the body surface. Magnification 2160x.

*Male genitalia* (Figs 186a–d). Pygofer with distal shoulders extended into bluntly-pointed lobe; upper lobes absent; basal lobes undivided, broadly rounded; dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant, barely divided apically; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view sharply angled through 90°; in dorsal view apical arms short, base broad and long with midline deeply furrowed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft gently curved, whip-like, very long and very thin; pseudoparameres absent; thecal apex entirely chitinized; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

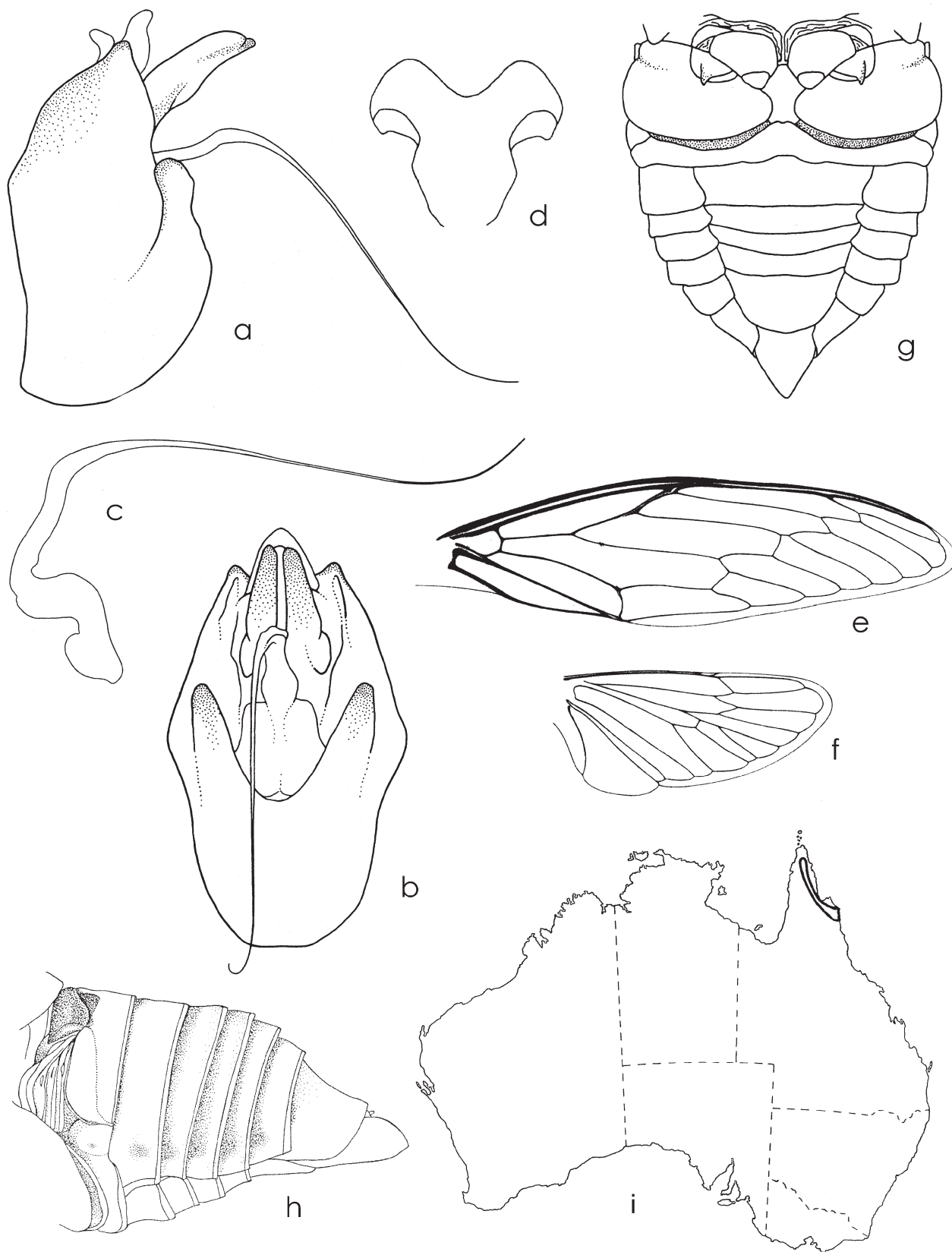
*Female reproductive system* unknown.

**Distinguishing characters.** Medium-sized cicadas. Body tending compressed vertically and extensively covered with a talc-like "dusting" of fine white pubescence mixed with a fine white, waxy exudation. Distinguished from all other genera by having a combination of the following two characters: distance between supra-antennal plate and eye much greater than length of supra-antennal plate; hind wing 1st cubital cell at distal end shorter than that of 2nd cubital cell (both tribal characters distinguishing the *Talcopsaltriini* of which *Talcopsaltria* is the only genus). Further, the edge of the paranotum may be unique in bearing many microscopic spine-like bristles. Males (Pl. 1, fig. 2) are easily distinguished by a combination of the following two characters: a short abdomen that is less than the length of head and thorax together, and small timbal covers that cover half or less of the timbal cavity and protrude forwards from the very top of the timbal cavity.

The male genitalia have a distinctive aedeagus that is whip-like, very long and very thin.

**Discussion.** The talc-like "dusting" on the body of *Talcopsaltria*, both above and below, results from a very fine, white, waxy exudation. This white waxy exudation is not uncommon in cicadas, occurring in many genera. It is, however, particularly extensive on fresh specimens of *Talcopsaltria*, covering virtually the entire head and body. It wears off with age and is easily removed from museum specimens by touching the body surface, relaxing specimens for setting, or wetting with alcohol or other solvents.

The waxy exudation is unusual in that it is excreted from pores situated on setae (Fig. 185) rather than from pores in the body cuticle itself. Similar exudation from setae (or spines) is known in some scale insects, family Monophlebidae (part of the old margarodids *sensu lato*), and family Ortheziidae (P. Gullan, pers. comm.), but not previously in the Cicadoidea.



**FIGURE 186.** Genus *Talcopsaltria* Moulds: (a) *T. olivei* Moulds, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) the same, underside of male body showing opercula; (h) the same, male abdomen, lateral view; (i) generic distribution.

Moulds (2008b) provides notes on the phylogenetic relationships of *Talcopsaltria* together with notes on the song, distribution, habitat and behaviour of the only included species, *T. olivei*. Further notes on *T. olivei* (as Species B), including a song analysis, are provided by Ewart (1993) and updated in Ewart (2005b).

### Genus *TAMASA* Distant

*Tamasa* Distant, 1905c: 386; Distant, 1906d: 73, 75; Ashton, 1912e: 105B; Ashton, 1914a: 349; Distant, 1914a: 2, 4; Ashton, 1921: 105, 106; Schulze, Kükenthal and Heider, 1926–40: 3381; Kato, 1932: 168, 169; Neave, 1940b: 393; Metcalf, 1944: 155; Tillyard, 1926: 162; Burns, 1957: 631; Kato, 1956: 67; Metcalf, 1963: 683; Duffels and van der Laan, 1985: 156, Moulds, 1990: 104; Moulds, 2005a: 387, 390, 412, 413, 425, 430, 434.

**Type species:** *Cicada tristigma* Germar, 1834, by original designation.

**Included species:** AUSTRALIAN: *burgessi* (Distant, 1905), **comb. n.**; *doddi* (Goding and Froggatt, 1904); *rainbowi* Ashton, 1912; *tristigma* (Germar, 1834). OTHERS: none.

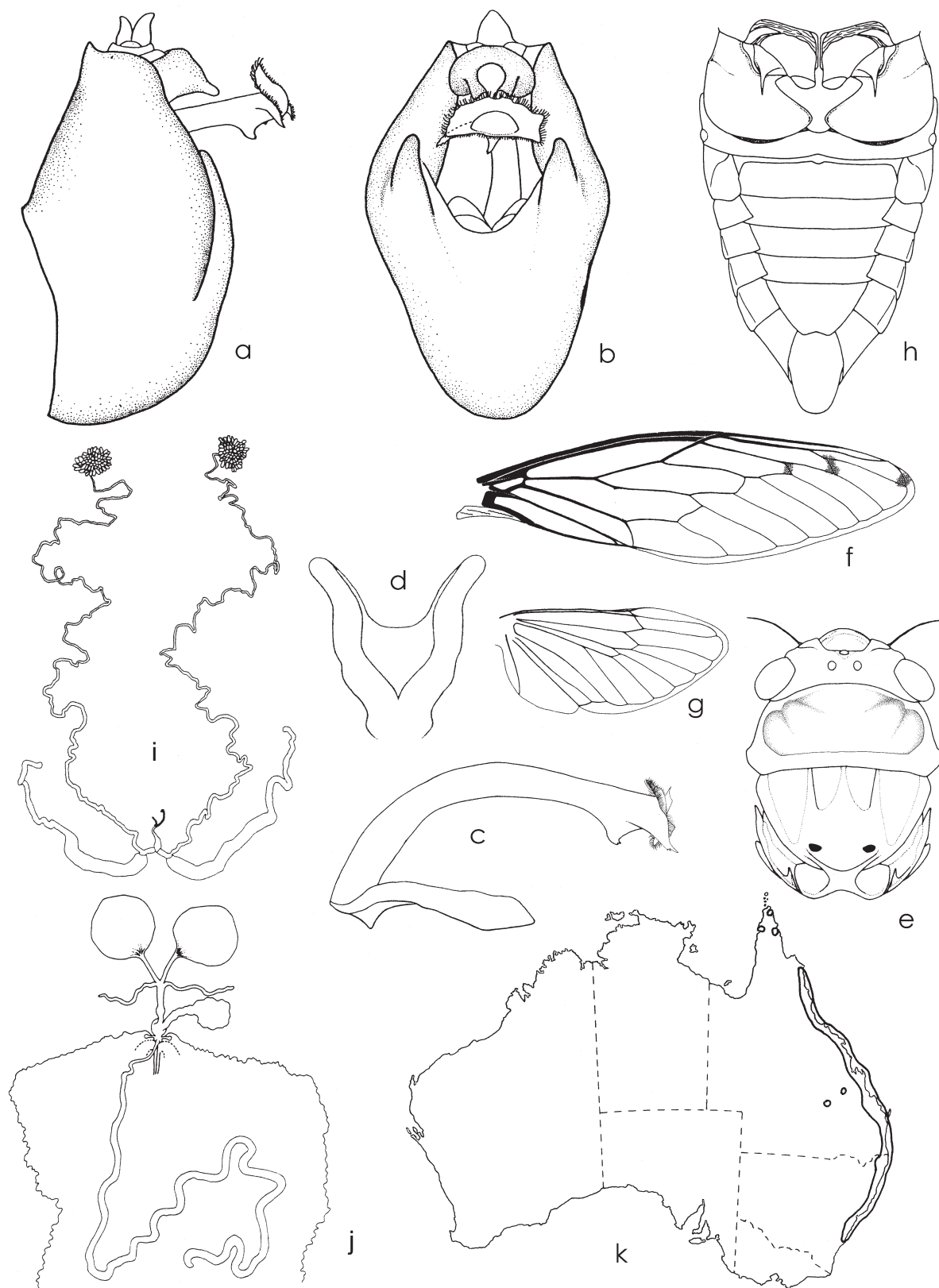
**Distribution** (Fig. 187k): Eastern Queensland and New South Wales south from Heathlands Station in the far north of Cape York Peninsula to Ulladulla on the NSW South Coast; mainly coastal but also tending inland (Ewart 1993, 2005b; Moulds 1990).

**Diagnosis.** *Head* (Fig. 187e) including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 187e): pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* (Fig. 187f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3 in some species, always at distal end of vein RA<sub>2</sub>, also at distal ends of longitudinal veins in *T. rainbowi*; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 187g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 187h) more or less confluent with distal margin of tympanal cavity, well developed towards abdominal midline with sharply rounded apex facing midline, clearly separated. *Male abdomen* (Fig. 187h) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* covers present, flat, reduced dorsally and not reaching metathorax, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 187a–d). Pygofer with distal shoulders broad, rounded; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present as a part of chitinated pygofer. Uncus undivided and dominated by median lobe; median lobe basically tubular, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view V-shaped, the division reaching to theca; basal portion of basal plate directed upwards so as to be nearly parallel with thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex entirely chitinated, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* (Fig. 187i) accessory glands short.

*Female reproductive system* (Fig. 187j) ditrysian; accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Small to medium-sized cicadas. Distinguished from other Australian genera by having fore wing veins M and CuA meeting the basal cell independently and spaced apart, its pale straw-coloured



**FIGURE 187.** Genus *Tamasa* Distant: (a) *T. tristigma* (Germar), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and thorax, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) the same, underside of male body showing opercula; (i) the same, male reproductive system, dissection with aedeagus removed from pygofer; (j) *T. doddi* (Goding and Froggatt), female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (k) generic distribution.



body, and an infuscation always present at the fore wing apex at the distal end of vein RA<sub>2</sub>; in these characters it is similar to *Parnkalla* but differs in having an ampliate lateral margin to the pronotal collar. Further, the male opercula partly cover the timbal cavity but are effectively undetectable in *Parnkalla*.

The male genitalia have a characteristic trumpet-shaped apex to the aedeagus and, together with *Parnkalla*, a characteristic, nearly tubular, short uncus and a basal plate that has its basal portion directed upwards so as to be nearly parallel with the thecal shaft.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis of Moulds (2005a) based on the type species *T. tristigma*. The species of this genus have been reviewed by Moulds (1990). Further notes on *T. tristigma*, including song analyses and notes on calling behaviour are provided by Bennet-Clark & Young (1994), Emery *et al.* (2005) and Ewart (1986, 1993, 1995, 2001a).

## Review of selected species

### *Tamasa burgessi* (Distant), **comb. n.**

*Abricta burgessi* was described by Distant from an undisclosed number of males taken at Ripple Creek, near Ingham in northern Queensland (Distant 1905e). Since that time no further specimens have been recorded and the identity of the species has remained unclear. Examination of the type (in BMNH) has revealed that *burgessi* does not belong to *Abricta* but to *Tamasa*. It is closely allied to *T. doddi* Goding & Froggatt, differing only in the male genitalia, the aedeagus of which is distally trumpet-shaped and scalloped around the opening; that of *doddi* is not trumpet-like and the margin carries two long spines.

## Genus **TAURELLA** gen. n.

**Type species:** *Melampsalta forresti* Distant, 1882.

**Included species:** AUSTRALIAN: *forresti* (Distant, 1882), **comb. n.**, *froggatti* (Distant, 1907), **comb. n.**, *viridis* (Ashton, 1912), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *taura*; a freemartin, i.e. a sterile heifer twin born with a bull, and referring to the bull-like horns on the uncus when viewed laterally. Feminine.

**Distribution** (Fig 188h): Barrow Island off the north-west coast of Western Australia, northern Queensland south from Cape York and as far west as the Northern Territory border, and through much of eastern Queensland and north-eastern New South Wales south to Taree (Ewart 1998b, 2005b; Moulds 1990).

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 188e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa broadest a little before node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 188f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 188g) tending to be sickle-shaped, small, very narrow, curving towards abdominal midline; inner margin not developed around meracanthus; far from distal margin of tympanal cavity; far from meeting; clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 188g) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; male tergites 2–7 all similar in size (2 and 3 not considerably larger); male sternites III–VI in cross-section convex.



*Timbal* covers absent; timbal ribs many (usually 7–8) and regular in size and closely spaced filling entire timbal area apart from basal dome; timbals not extended below wing bases.

**Male genitalia** (Figs 188a–d). Pygofer with distal shoulders not developed; upper lobes flat, finger-like in lateral view, very well developed, dominating pygofer between basal lobes and dorsal beak; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, closely aligned, lobe-like, in lateral view apically downturned with a subapical plate projecting forwards and 'horn-like', in dorsal view the subapical plate broad and toothed at its outer corner, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that is substantially compressed between theca and basal plate in lateral view; thecal shaft straight or curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female* dorsal beak absent; ovipositor clearly protruding beyond abdominal segment 9. *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Distinguished by the broad head that is clearly wider than the mesonotum and the lengths of the three distal vein sections that make up the inner margin of the radial cell which are all of similar length. Males have very characteristic opercula that are slender and sickle-like in shape, clearly not developed around the meracanthus and not meeting. There are usually 7–8 timbal ribs.

The male genitalia have claspers that are very distinct, downturned and beak-like in lateral view with a 'horizontal' subapical horn clearly visible when viewed from above. Further, the upper pygofer lobes are exceptionally long and slender.

**Discussion.** Notes on the distribution and biology of the species of this genus are provided by Moulds (1990). An analysis of the song of a *Taurella* species (sp. near *viridis*) is provided by Ewart (1998b). Notes on *T. sulcata*, including a song analysis, are provided by Ewart (2005b).

## Review of selected species

### *Taurella forresti* (Distant), comb. n.

*Melampsalta forresti* Distant, 1882: 129; pl. VII, figs 10, 10a–b

*Melampsalta warburtoni* Distant, 1882: 129; pl. VII, figs 9a–b. **Syn. n.**

*Melampsalta capistrata* Ashton 1912c: 31; pl. 4, figs c–c2. **Syn. n.**

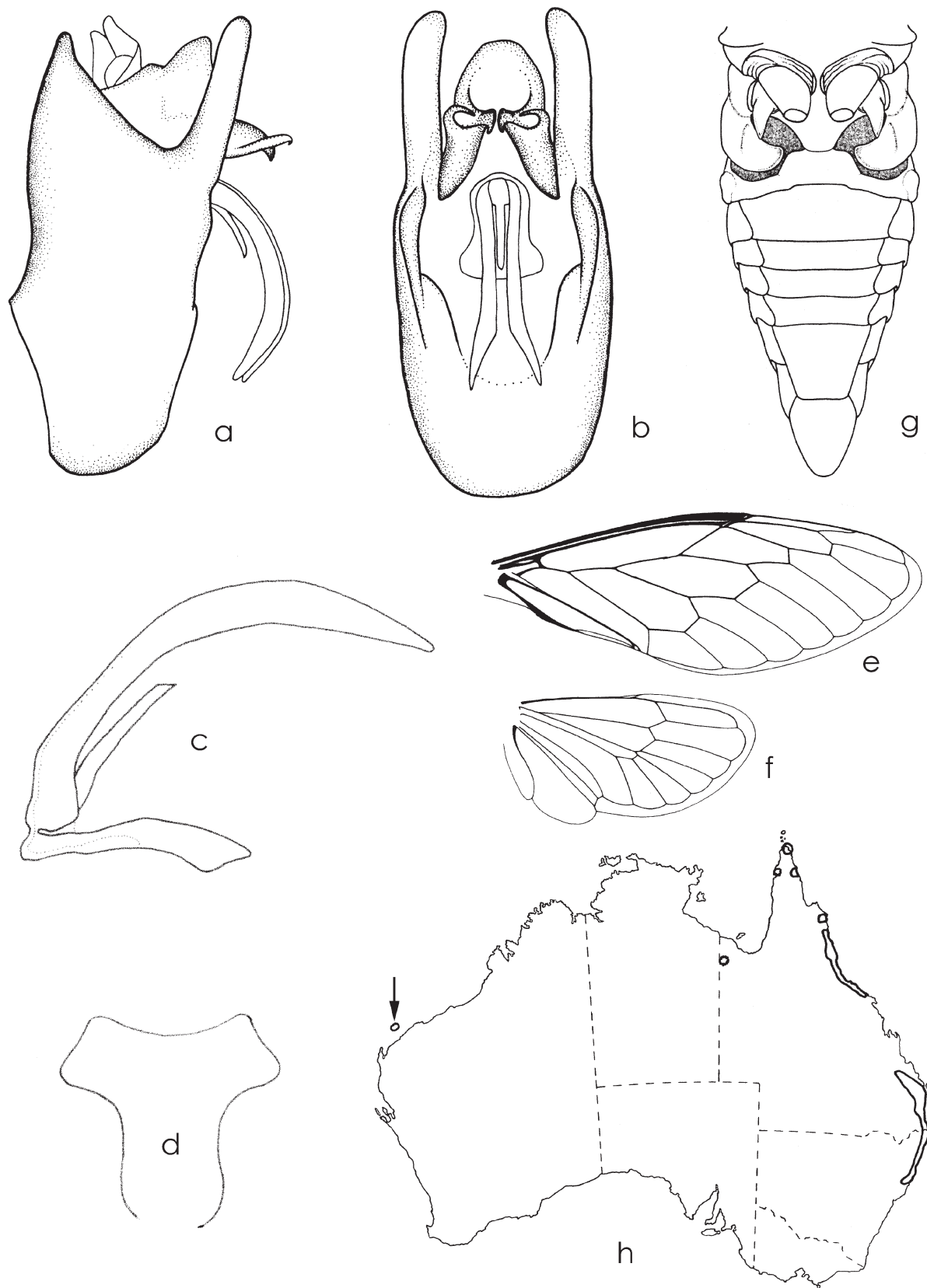
*Cicadetta warburtoni* (Distant): Metcalf, 1963, 3: 394.

*Cicadetta forresti* (Distant): Weidner and Wagner, 1968: 149.

*Cicadetta capistrata* (Ashton): Metcalf, 1963: 299.

There are two male syntypes of *M. forresti*, one in each of ZMH and BMNH, both from Gayndah, Queensland. There is a female syntype of *M. warburtoni* in ZMH and a male syntype in BMNH. The male is missing its pygofer but coloration, body form and wing venation show that both are conspecific with the syntypes of *M. forresti*. The syntypes of *M. warburtoni* supposedly originate from Peak Downs, Queensland, but this inland locality is far from the coastal and subcoastal habitats of this species and the locality requires confirmation.

Ashton (1912a) described *M. capistrata* from two males and one female syntypes. Two of these are believed to be a male and female in MV, both similarly labelled from Kuranda, and labelled as types. Another male in the same collection is similarly labelled but lacks a type label. A further male in the AM is labelled as a type (as reported by Burns, 1957) and is similarly labelled Kuranda (registered No. K67576). Regardless of their type status, all four specimens are conspecific with the syntypes of *M. forresti*. Differences between *capistrata* and *forresti* listed in Moulds (1990) fall within the range of variation found within *forresti*.



**FIGURE 188.** Genus *Taurella* **gen.n.:** (a) *T. forresti* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) the same, underside of male body showing opercula; (h) generic distribution.

### *Taurella froggatti* (Distant, 1937) comb. n.

*Melampsalta froggatti* Distant, 1907: 419.

*Melampsalta sulcata* Distant, 1907: 421. **Syn. n.**

*Cicadetta froggatti* (Distant): Metcalf, 1963: 314.

*Cicadetta sulcata* (Distant): Metcalf, 1963: 383.

*C. sulcata* is the orange variant of the red or crimson *Taurella froggatti*. In the southern part of the species' range individuals are red, primarily on the underside, but gradually change to orange or amber with higher latitudes. The male genitalia show no differences and A. Ewart (pers. comm.) could find no differences in song structure.

### Genus *TELMAPSALTA* gen. n.

**Type species:** *Melampsalta hackeri* Distant, 1915.

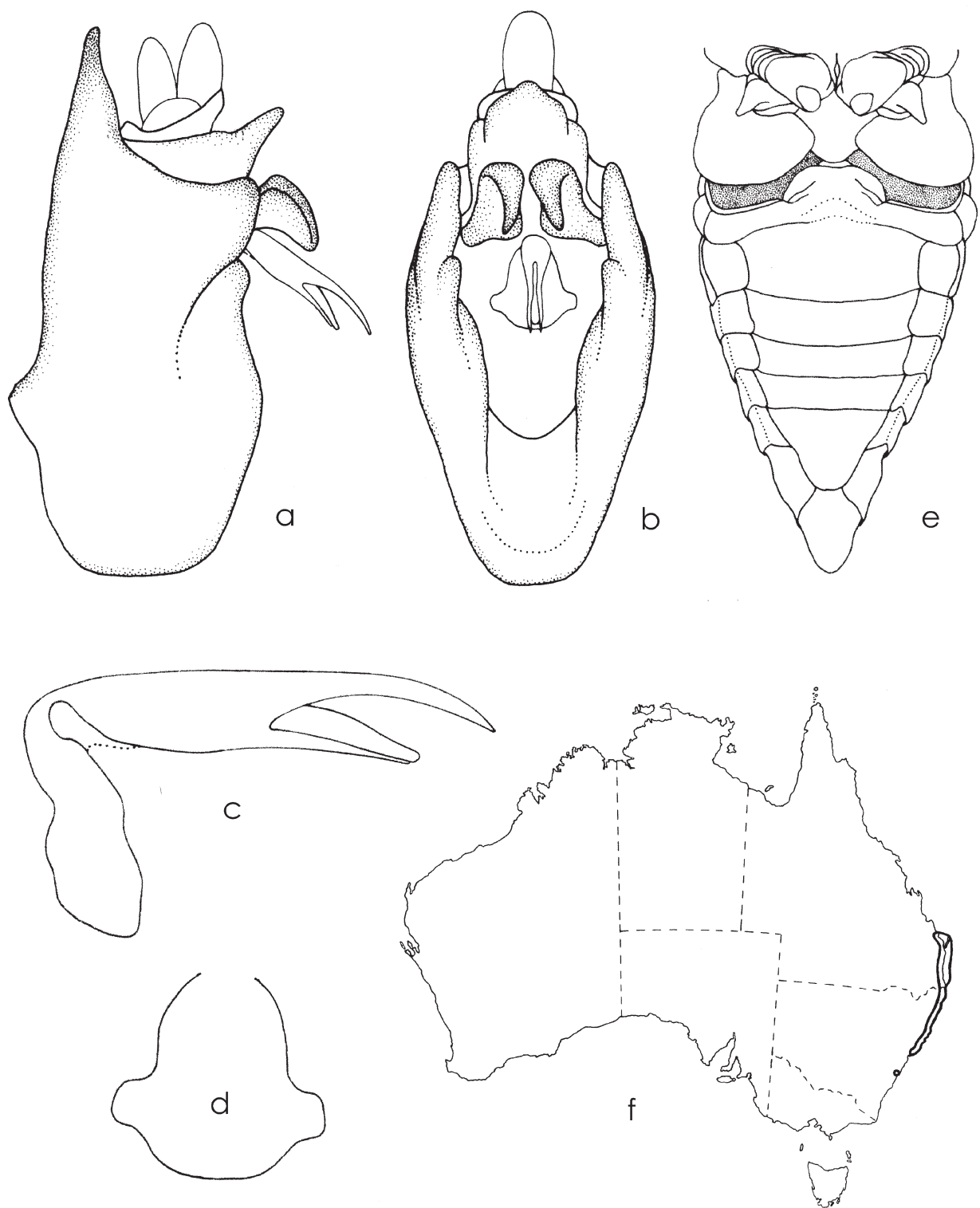
**Included species:** AUSTRALIAN: *hackeri* (Distant, 1915), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *telma* meaning standing water, pool or marsh and referring to the often swampy habitat of the type species, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. Feminine.

**Distribution** (Fig. 189f): South-eastern Queensland south from Bundaberg and Fraser and North Stradbroke Islands, and through eastern NSW south to Port Stephens and northern Sydney; often near salt water and never more than 40 km inland (Moulds 1990, Emery and Emery 2002).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell usually shorter than the distance from its apex to wing tip (about three quarters the length or more, rarely about the same length); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 189e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* (Fig. 189e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 189a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant,



**FIGURE 189.** Genus *Telmapsalta* gen.n.: (a) *T. hackeri* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, underside of male body showing opercula; (f) generic distribution.

restraining aedeagus; claw-like, in lateral view apically broadly rounded; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; clearly diverging towards distal ends but their apices nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, long (about three quarters or more length of pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Small cicadas. Fore wing veins M and CuA meet the basal cell with their stems completely fused as one, the fore wing radial cell is usually short and less than the distance from its apex to wing tip (rarely equal), the paranota are confluent with adjoining sclerites and lack a mid lateral tooth, and the posterior margin of the male's timbal cavity is ridged on its basal half rather than completely rounded. These characteristics distinguish *Telmapsalta* from most other genera. Distinguished from all others by the male genitalia which have an aedeagus with a typically 'trifid' theca exposing a fleshy endotheca, a long ventral support that is about three quarters the length of the pseudoparameres, and the pseudoparameres are aligned with the thecal shaft for much of their length.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the single species included in this genus, *T. hackeri*, are provided by Ewart (1995) and Moulds (1990).

### Genus *TEREPSALTA* gen. n.

**Type species:** *Cicada infans* Walker, 1850 (Pl. 2, figs 11a, 11b).

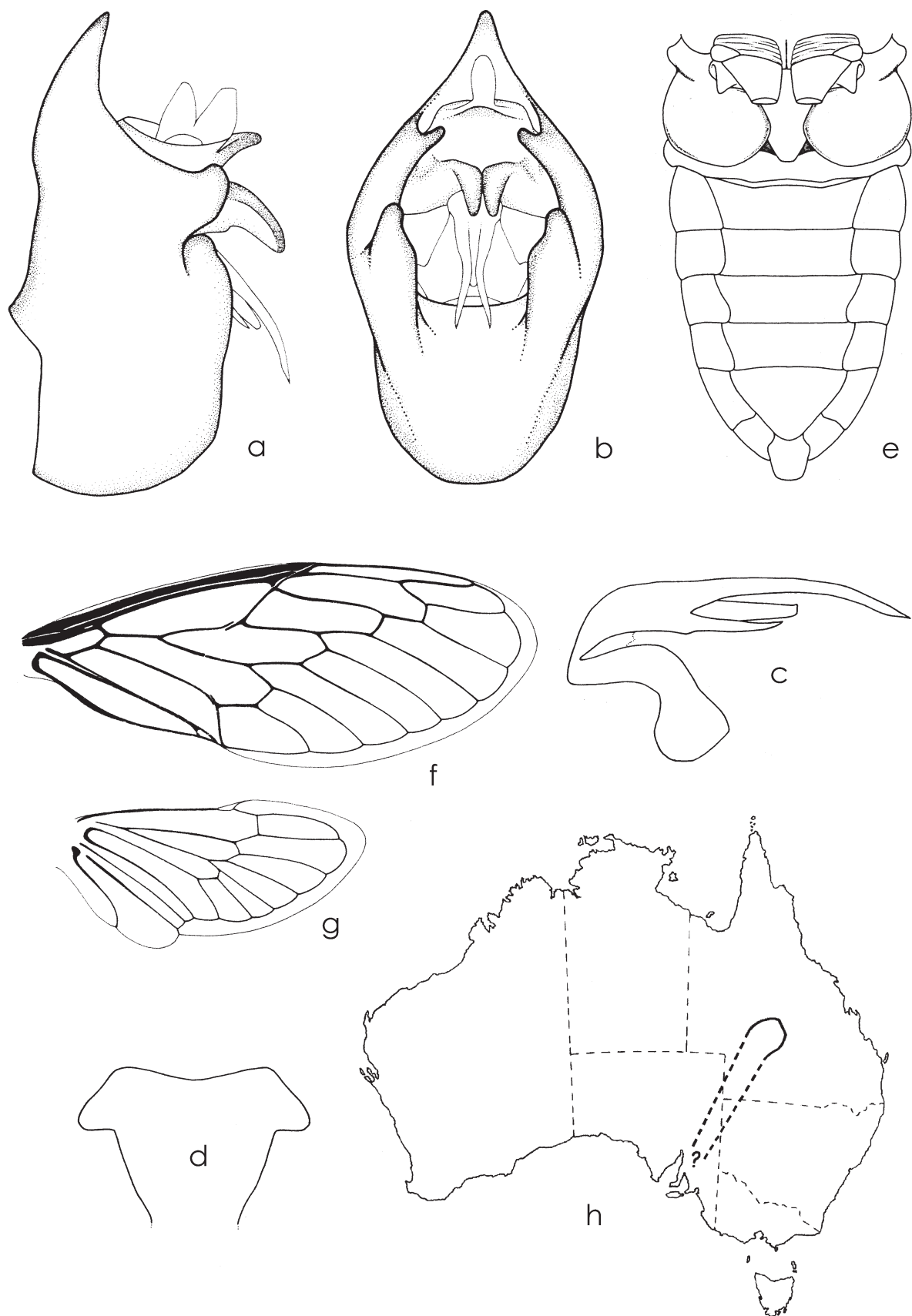
**Included species:** AUSTRALIAN: *infans* (Walker, 1850), **comb. n.** OTHERS: none.

**Etymology.** From the Latin *teres* meaning rounded or cylindrical, and from *psalta*, a traditional ending for cicada generic names which probably originates from the Latin *psaltria* meaning a female harpist. The former refers to the rounded, nearly cylindrical, abdomen of the male. Feminine.

**Distribution** (Fig. 190h): AUSTRALIA: The only confirmed localities are from central and south-western Queensland (Ewart, Emmott, Hill, Marshall and Moulds); otherwise only recorded from 'Adelaide', South Australia (type locality of *T. infans*) but it is unlikely the species occurs near Adelaide and was probably collected some distance north in much dryer habitat. OTHERS: none.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 190f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node, costa of male gently and evenly curved; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA close together at basal cell but not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m about equal to or longer than between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell clearly shorter than the distance from its apex to wing tip (about three quarters the length or more); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 190g) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe moderately broad with vein 3A





**FIGURE 190.** Genus *Terepsalta* gen.n.: (a) *T. infans* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) the same, underside of male body showing opercula; (h) generic distribution.

curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 190e) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 190e) as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, lateroventrally rounded to ventral surface; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites III–VII in cross-section convex, not unusually swollen. Timbals with three long ribs all similar in length and spanning the full height of the timbal (and one or two others not so long); basal dome large; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity ridged on lower half or so; timbals not extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 190a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, small to moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, restraining aedeagus; essentially flat, narrow in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; diverging towards distal ends; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft nearly straight; pseudoparameres present, dorsal of theca and originating distal of thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length, proximal half or so diverging from ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, of medium length, no more than about half the length of pseudoparameres; thecal apex entirely chitinated, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* unknown.

**Distinguishing characters.** Very small cicadas. Differs from all other Australian genera in having fore wing veins M and CuA reaching the basal cell separately, the hind wing anal lobe nearly parallel-sided for more than three quarters its length, and vein 3A two thirds the length of 2A. Distinguished from all genera by having the following combination of characters: head is as wide as the mesonotum, the paranota are confluent with adjoining pronotal sclerites and lack a mid lateral tooth, timbal covers are lacking, fore wing veins M and CuA reach the basal cell separately, and fore wing cross veins r and r-m are about the same distance apart (or a little more) than the distance between r-m and m.

The male (Pl. 2, fig. 11a) has a distinctive, parallel-sided abdomen with almost no taper on segments 2–6 and all tergites are rounded to the ventral surface rather than reflexed. The female (Pl. 2, fig. 11b) has a long, protruding ovipositor sheath.

The male genitalia have an aedeagus with a typical 'trifid' theca exposing a fleshy endotheca, and claspers that are essentially flat and narrow in lateral view with an overhanging lip along the outer margin and distally diverging in ventral view.

**Discussion.** *T. infans* does not belong to the African genus *Quintilia* as previously believed. It differs notably in the structure of the male genitalia, especially in the aedeagus, and fore wing vein R+Sc is not swollen.

## Review of species

### *Terepsalta infans* (Walker), comb. n.

(Pl. 2, figs 11a, 11b)

*Cicada infans* Walker, 1850: 201 (*nec* Walker 1862: 304)

*Tibicen infans* (Walker): Stål, 1862a: 485  
*Cicada abbreviata* Walker, 1862: 303–304  
*Melampsalta abbreviata* (Walker): Goding and Froggatt, 1904: 649–650  
*Quintilia infans* (Walker): Distant, 1906d: 144 (*nec* Froggatt, 1907: 352)

Distant (1906d) synonymised *C. infans* (described from a female in BMNH) and *Cicada abbreviata* Walker (described from a male in BMNH). I have examined these types, and an additional male in the MM, and I find no reason to question Distant's synonymy. As far as I can determine there are no other known specimens.

The only localities for the species not in question are all from South Australia. The types are labelled 'Adelaide' (although it is likely they did not originate from Adelaide itself). The reference by Walker (1862: 304) to *C. infans* occurring in New Zealand cannot refer to this species as Walker is commenting on the close affinity between 'infans' and his "grass-green" *Kanakia congrua* [now a synonym of *Chlorocysta vitripennis* (Westwood)] (Moulds 1990). *C. infans* is almost entirely black above, and black with brown (perhaps originally muddy yellow) below. Further, the "little yellowish green" species from "Southern Victoria and S. Australia" referred to by Froggatt (1907: 352) as *infans* must be regarded as a misidentification because *infans* is far from yellowish green.

### Genus *TETTIGARCTA* White

*Tettigarcta* White, 1845: 433; White, 1846: 332; Walker, 1850: 247; Walker, 1858a: 1; Dohrn, 1859: 76; Goding and Froggatt, 1904: 566, 595, 664; Distant, 1905g: 280; Distant, 1906d: 186; Froggatt, 1907: 354; Ashton, 1912b: 28; Horváth, 1913: 428; Ashton, 1914a: 357; Hardy, 1918: 71; Handlirsch, 1925: 1116; Schulze, Kükenthal and Heider, 1926–40: 3434; Myers, 1928a: 59; Myers, 1928b: 406, 413, 424, 460, 464; Myers, 1929a: 35; Myers, 1929b: 46, 50, 51, 54, 61, 78, 84, 85, 89, 90, 92, 93, 114, 116, 134, 201, 207; Muir, 1930: 549, 550; Kato, 1932: 11, 13, 25, 26, 30, 32, 33, 34, 140, 191; Imhof, 1933: 307; Piton and Theobald, 1937: 86; Imhof, 1940: 397; Neave, 1940b: 445; Evans, 1941: 35, 47; Metcalf, 1944: 156; Zeuner, 1944: 111–116; Evans, 1946: 42, 46; Evans, 1948: 508; Bekker-Migdisova, 1949: 21, 22, 56, 62; Ossiannonesson, 1949: 118; Kramer, 1950: 68; Pesson, 1951: 1497, 1498; Heslop-Harrison, 1952: 690; Evans, 1956a: 222; Evans, 1956b: 130; Kato, 1956: 70; Burns, 1957: 671; Evans, 1957: 283, 286, 291; Heslop-Harrison, 1957: 48, 52; Pringle, 1957: 144, 147–150, 154, 155, 156, 157; Schremmer, 1957: 46; Burns, 1958: 147; Evans, 1958a: 135, 143; Evans, 1958b: 46; Evans, 1959: 152–153; Heslop-Harrison, 1960: 633, 634; Evans, 1963: 80, 81, 86; Leston and Pringle, 1963: 396, 400; Metcalf, 1963: 467; China, 1964: 159, 160; Evans, 1964: 172, 173; Boulard, 1965: 800, 810; Lloyd and Dybas, 1966: 483, 485; Matsuda, 1970: 248, 257, 260; Woodward, Evans and Eastop, 1970: 412; Wootton, 1971: 318; Fleming 1975b: 299; Young, 1975: 113; Matsuda, 1976: 296–298; Whalley, 1983: 140; Duffels and van der Laan, 1985: 3; Dworakowska, 1988: 73, 74, 76, 80, 88, 92, 96; Evans, 1988: 61; Evans, 1989: 102; Ewart, 1989b: 75; Boulard and Nel, 1990: 38, 40, 41, 43; Moulds, 1990: 45; Duffels and de Boer, 1990: 1226; Moulds and Carver, 1991: 465, 466; Duffels, 1993: 1226; Nel, 1996: 85, 88, 90, 91; Grimaldi and Engel, 2005: 308, 630; Moulds, 2005a: 388, 389, 394, 410, 412, 413, 415, 426, 430; Shcherbakov, 2009: 343, 344, 345, 346, 347, .

*Tettigarota* [sic]; Marschall, 1873: 383; Schulze, Kükenthal and Heider, 1926–40: 3434 (misspelling).

*Tettigareta* [sic]; Kirby, 1896: 458 (misspelling).

*Tettigarta* [sic]; Gomez-Menor, 1957: 16 (misspelling).

**Type species:** *Tettigarcta tomentosa* White, 1845, by monotypy.

**Included species:** AUSTRALIAN: *crinita* Distant, 1883; *tomentosa*, White 1845. OTHERS: none.

**Distribution** (Fig. 191j): Mountain areas of New South Wales south from the Blue Mountains, the Brindabella Range in the Australian Capital Territory, the mountains of Victoria west to the Otway Range and throughout much of Tasmania.

**Diagnosis.** *Head* (Fig. 191e) including eyes narrow, considerably less than mesonotum; supra-antennal plate meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 191e): pronotum exceedingly large and concealing much of mesonotum; pronotal collar largely ill-defined, paranota weakly ampliate, no mid lateral tooth; scutellum not developed into a cruciform elevation; opercula absent. *Fore wings* (Fig. 191f) hyaline with extensive maculation; 8 apical cells; subapical cells absent; basal cell long and narrow; costal vein (C) no higher than R+Sc; vein CuA weakly bowed so that cubital cell no wider than medial cell; veins M and CuA clearly separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A unfused; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 191g) with numerous microscopic setae on

dorsal surface; 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A straight, long, separated from wing margin. *Fore leg* femoral primary spine lying flat. *Male opercula* absent, as are tympanal organs. *Male abdomen* (Fig. 191e) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbals* small, weakly ribbed; in lateral view timbals extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 191a–d). Pygofer with distal shoulders not developed; upper lobes absent; basal lobes absent; dorsal beak absent. Uncus undivided and dominated by median lobe; median lobe n-shaped, apically with sides meeting but not fused; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view basally very narrow becoming broad apically; in dorsal view parallel-sided, basal two-thirds without sclerotisation except laterally; basal portion of basal plate directed away from thecal shaft; ventral rib absent; junction between theca and basal plate sinewy; thecal shaft curved in an arc; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica presumed absent. *Male reproductive system* (Fig. 191h) with accessory glands short.

*Female reproductive system* (Fig. 191i) monotrysian; accessory glands of common oviduct absent.

**Distinguishing characters.** Medium to large cicadas. The two species of *Tettigarcta* can be distinguished from all other Australian cicadas by any one of the following: their exceedingly narrow head (distance between the eyes less than one eye diameter); the very large pronotum which covers all of the mesonotum except the scutal area, and the brown or black maculation on the fore wings.

Features that strictly define *Tettigarcta* are considered to be the very narrow head; the long legs with the hind coxae overhanging the abdomen; the heavily maculated fore wings; a well developed nodal line and an aedeagus with a sclerotised dorsal crest near its apex.

**Discussion.** The two living species of *Tettigarcta* are the only extant representatives of the family Tettigarctidae, all other species and genera being known only from fossils. Features defining the Tettigarctidae can be found in Moulds (2005a).

Shcherbakov (2009) reviewed the family Tettigarctidae recognizing 17 genera, all but *Tettigarcta* being known only from the fossil record. Phylogenetic relationships of *Tettigarcta* based on extant taxa using molecular and morphological analyses are summarised by Cryan (2005) and Moulds (1990, 2005a). *Tettigarcta* is most closely allied to the Cenozoic fossil genus *Meuniera* Piton (Boulard and Nel 1990, Shcherbakov 2009). Because this fossil genus is known only from wing impressions, differences can be summarised only for wing structures. *Tettigarcta* differs in having a fore wing venation with cross veins matching those found in 'typical' extant cicada wings. The distribution and biology of the two extant species of *Tettigarcta* (both from Australia) have been summarised by Moulds (1990). *Tettigarcta* species do not communicate by air born songs but by substrate vibrations used by both sexes (Claridge, Morgan and Moulds 1999), and are the only cicadas within the Cicadoidea to do so. Further notes on *T. tomentosa* are provided by Moss (1989).

## Review of selected species

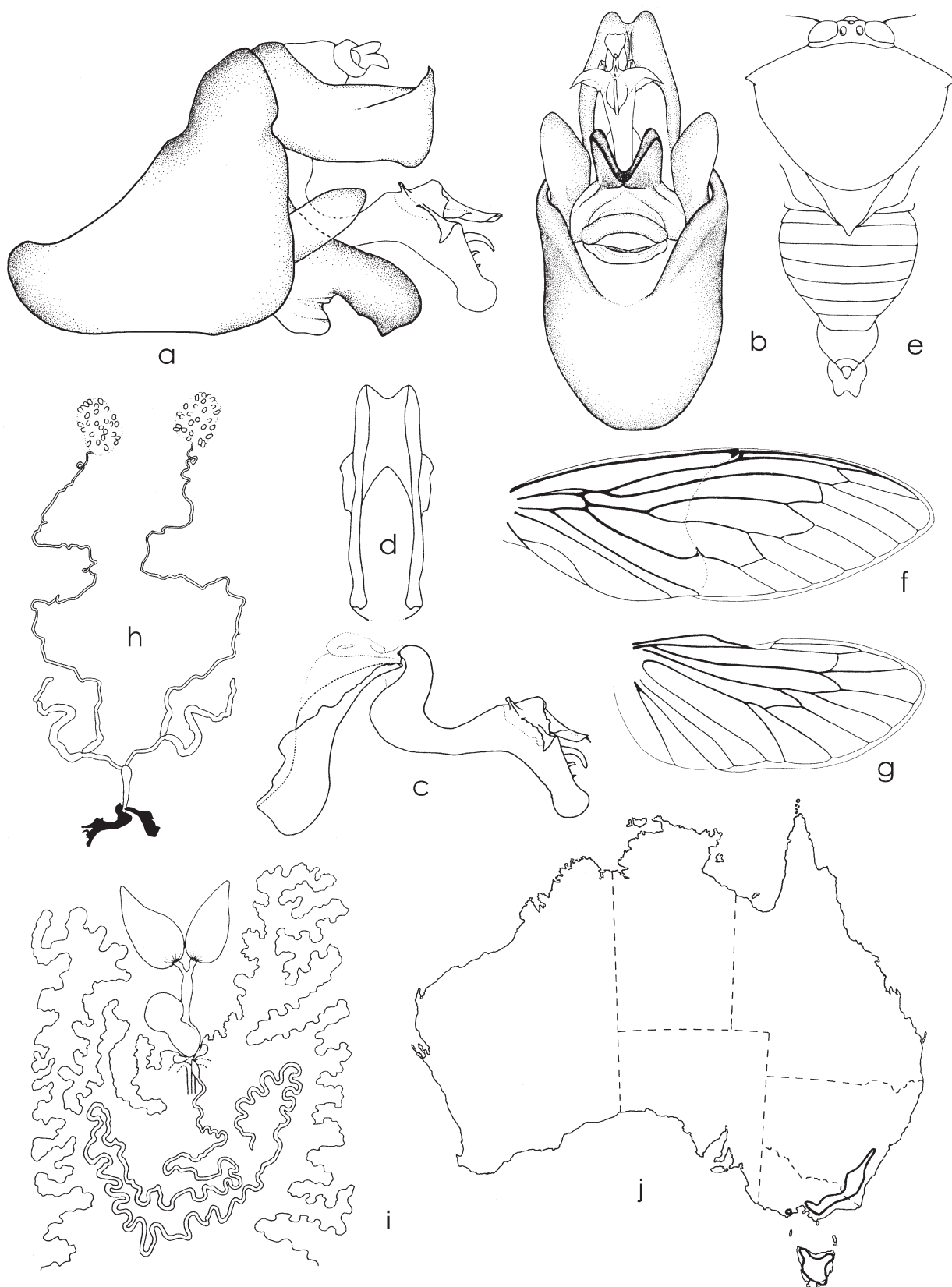
### *Tettigarcta crinita* Distant

*Tettigarcta crinita* Distant 1883: 188; pl. XXV, figs 5, 5a–c.

*Tettigarcta ciliata* Singh-Pruthi 1925: 243. Incorrect subsequent spelling.

*Tettigarcta criniti* Kato 1930: 147. Incorrect subsequent spelling.

Singh-Pruthi (1925) briefly mentioned *Tettigarcta ciliata* in a discussion of cicada male genitalia. There has never been a *T. ciliata* (or any other *ciliata*) within the Cicadoidea and obviously Singh-Pruthi did not intend to create a new name. The context in which Singh-Pruthi uses *Tettigarcta ciliata* clearly indicates that he intended *Tettigarcta crinita*, and *ciliata* should therefore be regarded as a misspelling. Metcalf (1963) was amiss in crediting Singh-Pruthi with the establishment of a new name.



**FIGURE 191.** Genus *Tettigarcta* White: (a) *T. crinita* Distant, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, male head and body, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) male reproductive system, dissection with aedeagus removed from pygofer; (i) the same, female reproductive system, dissection in dorsal view, ovipositor diagrammatic; (j) generic distribution of extant species.



## Genus *THAUMASTOPSALTRIA* Kirkaldy

*Acrilla* Stål, 1863a: 575 (nec *Acrilla* Adams, 1860); Walker, 1870: 95; Marschall, 1873: 351; Distant, 1892, 103, 151; Breddin, 1901: 200, 201; Jacobi, 1903: 14; Kuhlitz, 1905: 79; Schulze, Kükenthal and Heider, 1926–40: 37; Neave, 1939a: 41; Esaki and Miyamoto, 1975: 638.

*Thaumastopsaltria* Kirkaldy, 1900: 242 (replacement name for *Acrilla* Stål, 1863a); Kirkaldy, 1904: 283; Distant, 1905f: 213, 216; Distant, 1906d: 1–54, 159; Horváth, 1913: 427, 429; Ashton, 1914a: 351; Schulze, Kükenthal and Heider, 1926–40: 3445; Imhof, 1933: 306; Neave, 1940b: 455; Burns, 1957: 644; Metcalf, 1963: 258–259; Esaki and Miyamoto, 1975: 638; Duffels, 1977: 205, 207; Holloway, 1979: 235; Duffels and van der Laan, 1985: 249; Duffels, 1986: 328; de Boer, 1990: 64; Moulds, 1990: 191; de Boer, 1991: 2; de Boer, 1992a: 164; de Boer, 1992b: 17–44; de Boer, 1993a: 16, 17, 18, 19; de Boer, 1993b: 141, 142, 143, 144, 145; de Boer, 1994b: 90; de Boer, 1995a: 15, 16, 17; de Boer, 1995b: 204, 207, 211, 215, 217–218, 219; de Boer, 1995c: 2, 3, 5, 6, 7; de Boer, 1995d: 207–208, 217, 218, 219, 222, 224, 225, 226, 229, 231, 233, 234, 235; de Boer, 1996: 350, 351, 352, 353, 354, 355, 356, 358; de Boer and Duffels, 1996a: 156, 165, 166, 170, 171, 172, 173; de Boer and Duffels, 1996b: 301, 304, 313, 314, 316, 318; de Boer, 1997: 92, 93, 98, 114; Moulds, 2005a: 390, 412, 430, 435.

*Thaumastopsaltria* [sic]; Waterhouse, 1902: 372 (misspelling); Boulard 1979a: 46.

*Thoumastopsaltria* [sic]; Kato, 1932: 184, 185 (misspelling); Kato, 1956: 70.

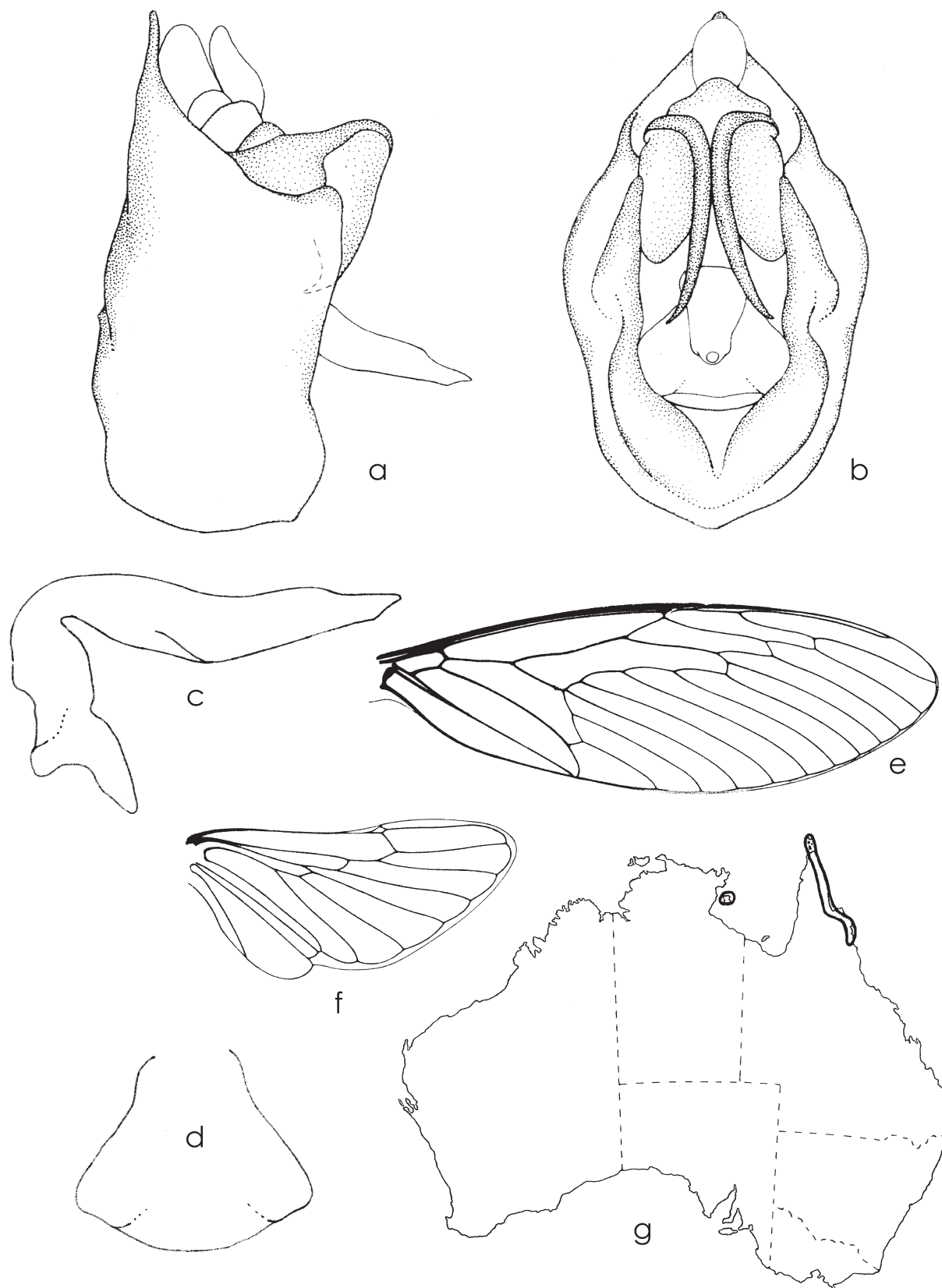
**Type species:** *Acrilla adipata* Stål, 1863, by original designation.

**Included species:** AUSTRALIAN: *globosa* (Distant, 1897). OTHERS: *adipata* (Stål, 1863); *lanceola* de Boer, 1992; *pneumatica* de Boer, 1992; *sarissa* de Boer, 1992; *sicula* de Boer, 1992; *spelunca* de Boer, 1992.

**Distribution** (Fig. 192g): Waigeo, Misoöl Island, mainland New Guinea, D'Entrecasteaux Islands, New Britain, Umboi Island, northern Australia and doubtfully from Buka Island and Bougainville (de Boer 1992b). The single Australian species is known from along the eastern margin of Cape York Peninsula from Banks Island in Torres Strait to Daintree, and from Groote Eylandt, Northern Territory (Moulds 1990, as *T. glauca*, = *T. globosa*).

**Diagnosis.** *Head* including eyes narrow, considerably less than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides' and with a midline that is obtusely bent around midlength and thereafter straight to anteclypeus, and the lateral margins carry several rows of short parallel ridges. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 192e) hyaline; with 8–15 apical cells (variable between species and even within species); subapical cells mostly absent; ulnar cell 3 substantially parallel to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma absent; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting at basal cell but veins not aligned together; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu more or less equally; veins CuP and 1A fused in part; infuscation absent; wing outer margin greatly reduced and mostly contiguous with ambient vein. *Hind wings* (Fig. 192f) with 6–10 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine lying flat. *Male opercula* distant from lateral margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically tapering to a blunt point, inner margin straight, clearly not meeting. *Male abdomen* inflated; tergites in cross-section with sides concave, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* ribs many, and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 192a–d). Pygofer with distal shoulders not developed; upper lobes thickened, small, bud-like, accentuated by adjacent 'dimple' in pygofer, bearing an angular lateral protrusion; basal lobes undivided, ill-defined, substantially confluent with pygofer margin; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned, restraining aedeagus, most species (including *T. globosa* from Australia) with flat, sharply pointed, blade-like claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, nearly diamond-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.



**FIGURE 192.** Genus *Thaumastopsaltria* Kirkaldy: (a) *T. globosa* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution in Australia.

*Female abdominal segment 9* long and slender; ovipositor sheath protruding well beyond anal styles (a distance about equal to the length of the dorsal spine). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to medium-sized cicadas. The single Australian species is clearly distinguished from all other Australian genera by the fore wings having 12 apical cells (11 or 13 if aberrant) and no subapical cells. In addition the fore wing and hind wing apical cells are very long and narrow and the fore wing ambient vein is at the margin.

De Boer (1992b) redefined the generic concept of *Thaumastopsaltria* on the basis of the shape of the postclypeus and long ovipositor. The postclypeus in lateral view is obtusely bent at about mid point and thereafter straight to anteclypeus, plus the lateral margins show several rows of short parallel ridges. The ovipositor is long, clearly projecting beyond abdominal segment 9 far more than in allied genera. Fore wing venation was considered unreliable for defining the genus because the venation is so variable within and between species and also because species in other genera of Chlorocystini have corresponding cell numbers.

The male pygofer upper lobes in most species are distinctly inflated towards the ventral margin, a feature believed to be unique for *Thaumastopsaltria* (de Boer 1992b).

**Discussion.** De Boer (1992b) discussed the biogeography of *Thaumastopsaltria* and provided an account of all species. He also concluded that *Thaumastopsaltria*, together with *Cystopsaltria*, *Cystosoma* and *Mirabilopsaltria* (the latter not found in Australia) form a clade that is the sister group to all other Chlorocystini. These relationships have been discussed by Moulds (2005a). Moulds (1990) has provided notes on the distribution and biology of the single Australian species.

### Genus *THOPHA* Amyot and Serville

*Thopha* Amyot and Serville, 1843: 471; Westwood, 1843: 33; Agassiz, Erichson and Germar, 1846: 14; Agassiz, 1848: 1065; Blanchard, 1848b: 560; Spinola, 1850: 50; Walker, 1850: 42, 258; Walker, 1858a: 1; Walker, 1858b: 5; Desmarest, 1859: 203; Dohrn, 1859: 72; Stål, 1866a: 6; Dallas, 1867: 557; Stål, 1870a: 6; Distant, 1882: 125; Kirby, 1896: 458; Kirby, 1897: 598; Kirkaldy, 1903b: 232; Distant, 1904a: 301, 302; Goding and Froggatt, 1904: 564, 567, 571; Imhof, 1905: 223; Distant, 1906d: 26; Froggatt, 1907: 348; Distant, 1912a: 20; Ashton, 1914a: 346; Ashton, 1921: 89; Delétang, 1923: 611; Lea, 1926: 40; Tillyard, 1926: 162; Schulze, Kükenthal and Heider, 1926–40: 3466; Myers, 1929b: 135; Kato, 1932: 10, 152, 232; Kato, 1933: 351; Neave, 1940b: 475; Cooper, 1941: 295; Metcalf, 1947: 163; Kato, 1956: 46, 67, 78; Burns, 1957: 611; Burns, 1962a: 259, 260; Burns, 1962b: 269–279; Metcalf, 1963: 135; Duffels and van der Laan, 1985: 48; Moulds, 1990: 53; Moulds, 2001: 195–203; Moulds, 2005a: 387–389, 393, 412, 413, 430, 434; Moulds, 2008a: 129, 135, 137, 139, 140.

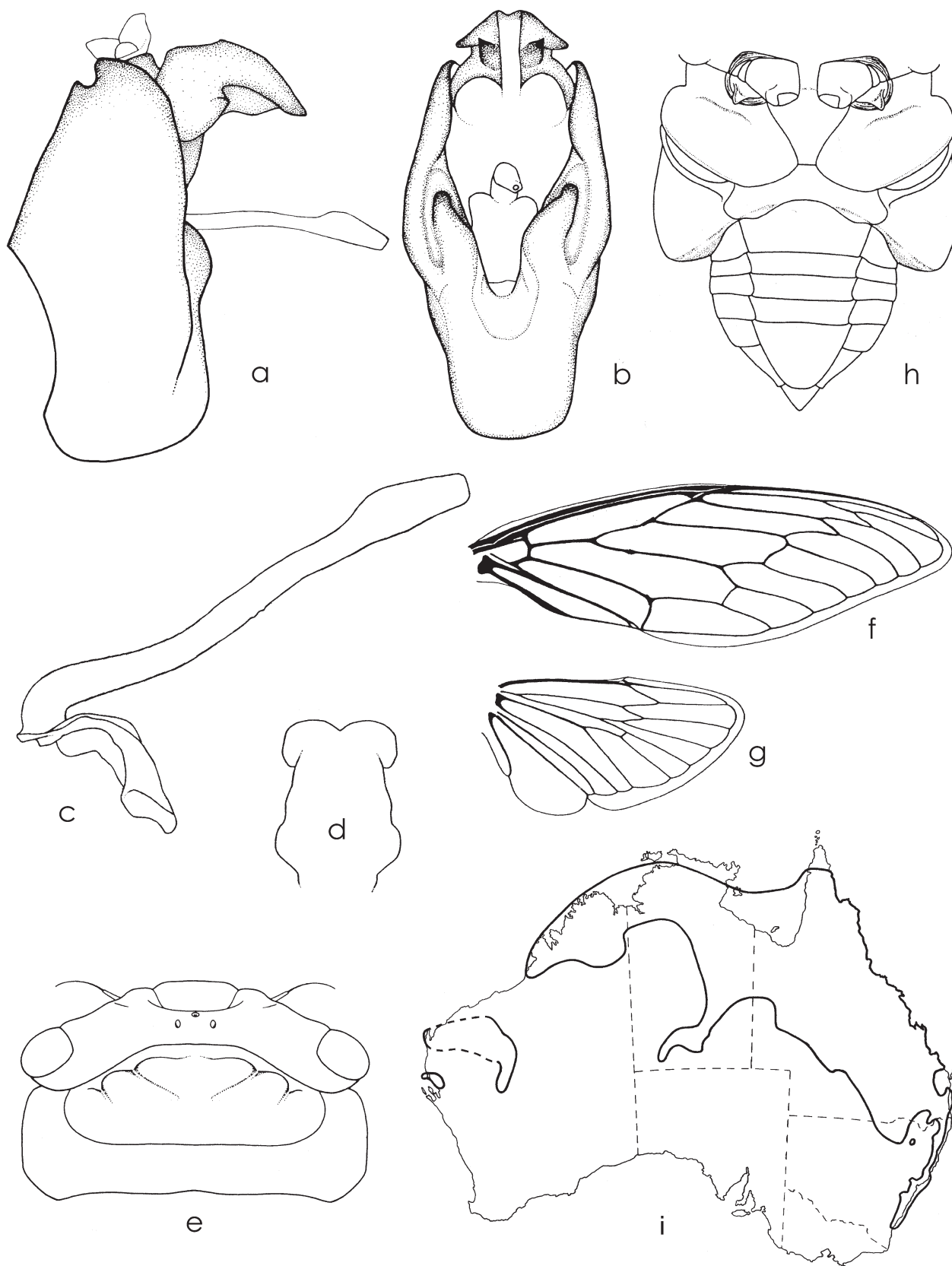
*Toph* [sic]; von Linden, 1901: 761; Handlirsch, 1925: 1117; Schremmer, 1957: 21. (Misspelling).

**Type species:** *Tettigonia saccata* Fabricius, 1803, by subsequent designation by Westwood, 1843: 33.

**Included species:** AUSTRALIAN: *colorata* Distant, 1907; *emmotti* Moulds, 2001; *hutchinsoni* Moulds, 2008; *saccata* (Fabricius, 1803); *sessiliba* Distant, 1892. OTHERS: none.

**Distribution** (Fig. 193i): Monsoonal northern Australia and adjoining semi-arid regions, Central Australia (but excluding South Australia), the Carnarvon and Murchison districts of Western Australia, and eastern Australia south to Moruya on the NSW South Coast (Coombs & Toolson 1991; Ewart 2005b; Moulds 2001, 2008a).

**Diagnosis.** *Head* (Fig. 193e) including eyes wide, clearly wider than mesonotum; vertex laterally elongate with eyes widely separated from supra-antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 193e): pronotal collar width at dorsal midline broad, equal to about diameter of eyes or a little greater; paranota strongly ampliate, evenly rounded, sloping forwards in lateral view, no mid lateral tooth but with margin partly serrate (in most individuals); cruciform elevation with its dome wider than long; epimeral lobe reaching operculum. *Fore wings* (Fig. 193f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad, tending to be rounded; costal vein (C) no higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA widely separated at basal cell; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion longest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 193g) with 6 apical cells; no



**FIGURE 193.** Genus *Thopha* Amyot and Serville: (a) *T. saccata* (Fabricius), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and pronotum; (f) the same, fore wing; (g) the same, hind wing; (h) the same, underside of male body showing opercula; (i) generic distribution.

infuscation on ambient vein; width of 1st cubital cell at distal end about equal to 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 193h) completely covering tympanal cavity, completely encircling meracanthus, not overlapping. *Male abdomen* (Fig. 193h) in cross-section with sides of tergites straight or weakly convex, lateroventrally rounded to ventral surface; tergites 2 and 3 enlarged, accounting for approximately half abdominal length; sternites IV–VII in cross-section flat except for upward tilted margin. *Timbal* covers present, grossly swollen, sac-like and projecting distally a little beyond 1st abdominal segment, anterior dorsal margin fully rounded and extending to metathorax and tightly closed, lower margin extending anteriorly from or very near auditory capsule; timbal ribs irregular in size with prominent intermediate short ribs; basal dome very large; in lateral view timbals extended below wing bases.

*Male genitalia* (Figs 193a–d). Pygofer with distal shoulders broad, rounded, the most distal part of pygofer; upper lobes absent; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus undivided and dominated by median lobe; median lobe finger-like, tending to be tubular, long, dominant; accessory spines (claspers) absent. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view broad, apically broadly bilobed; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Large to very large cicadas. *Thopha* can be distinguished from all other Australian genera by having the following combination of characters: a wide head with the distance between the eyes greater than between the lateral angles of the pronotum, a very broad pronotal collar that is not only broad across the dorsal surface but is also strongly ampliate laterally, fore wing veins M and CuA widely separated at the basal cell, and no wing infuscations. Further, the males of *Thopha* possess very large and very distinctive, bulbous, sac-like timbal covers, a feature shared within the Australian fauna only with *Arunta*; the colour of these timbal covers clearly differs between the two genera with those of *Thopha* being dark brown or orange while those of *Arunta* are white. Also, *Thopha* differs from *Arunta* in having the timbal covers extending backwards a little beyond the 1st abdominal segment while those of *Arunta* extend beyond the 2nd abdominal segment, and the head of *Thopha* is very wide so that the distance between the eyes is greater than between the lateral fissures of the pronotum while the head of *Arunta* is narrow so that the eyes are closer together than the width of the lateral fissures.

The male genitalia have the distal shoulders of the pygofer partially developed and in some species tending towards having pointed apices, the basal lobes are kinked inwards subapically, the uncus is medially divided often almost to its base and the two parts each carry a smaller subapical ventral tooth, and the distal portion of the theca is characteristically swollen with its diameter increased.

**Discussion.** The phylogenetic relationships of this genus have been discussed by Moulds (2001, 2005a, 2008a). Burns (1962b) and Moulds (1990, 2001, 2008a) have reviewed the genus. Notes on species and song analyses can be found in Ewart (1995, 2005b), Ewart and Popple (2001) and Young (1973). Notes on seasonal occurrence and plant association of *T. saccata* are provided by Emery *et al.* (2005) and Hawkeswood (2007).

### Genus *TOXALA* gen. n.

**Type species:** *Urabunana verna* Distant, 1912.

**Included species:** AUSTRALIA: *verna* (Distant, 1912), **comb. n.** OTHERS: none.

**Etymology.** From the Greek *toxón*, meaning bowed and referring to the strongly bowed fore wing costal margin. Feminine.

**Distribution** (Fig. 194g): Known only from scattered populations in south-eastern Queensland south from Maryborough, and eastern New South Wales south to Sydney (Moulds 1990).

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotum in dorsal view parallel-sided or widening towards posterior; pronotal collar width at dor-



sal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 194e) hyaline, without infuscations; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa characteristically swollen proximal to node giving costal margin a strongly bowed appearance, costa of male strongly bowed on distal half; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; distance between cross veins r and r-m much less than distance between r-m and m; apical cells 3–6 about equal to or longer than ulnar cells; radial cell very long (about equal to or longer than distance from its apex to wing tip); infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 194f) with 3 or 4 apical cells (rarely 5 if aberrant but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting. *Male abdomen* as wide as or a little wider than thorax; tergites in cross-section with sides straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergite 1 narrow along dorsal midline; tergite 2 about as wide as tergite 3 along dorsal midline; sternites IV–VII in cross-section convex, not unusually swollen. *Timbals* with 3 long ribs spanning the full height of the timbal (and 1 or 2 not so long, interspersed with short ribs; large basal dome; anterior part of timbal mostly occupied by ribs; posterior margin of timbal cavity rounded and completely lacking a ridge on lower half or so; timbals not extended below wing bases; timbal covers absent.

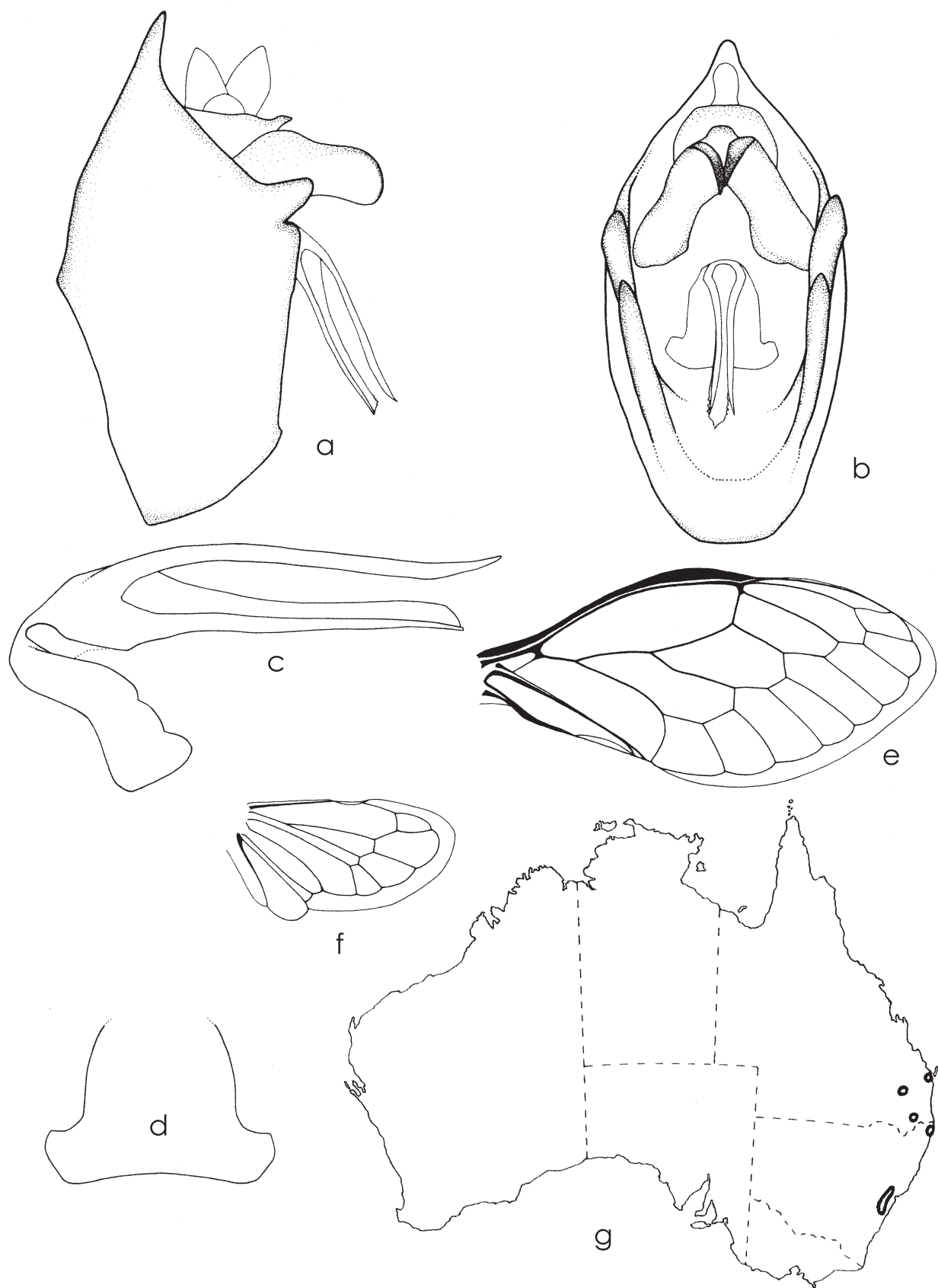
*Male genitalia* (Figs 194a–d). Pygofer in ventral view ovoid to sub ovoid in shape, distal portion of upper pygofer lobes not the widest point, not strongly tapered from upper pygofer lobes to base; pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, broadly rounded in lateral view, abutted against or partly tucked behind pygofer margin; dorsal beak present as a developed apical spine or pointed apex (visible in dorsal view) and a part of chitinated pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus; essentially flat, narrow in lateral view, outer face with an overhanging lip along margin; unfused; lacking a rounded, inward-facing swelling on proximal half or so of inner margin; distally parallel to each other; their apices not widely separated, certainly nowhere near the widest dimensions of the claspers. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view as long as or longer than broad, apically broadened with 'ears', basal portion of basal plate directed forwards away from thecal shaft, ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that possesses a chitinous back; thecal shaft straight; pseudoparameres present, dorsal of theca and originating distal of, but near, thecal base, unfused throughout their length, in dorsal view turning in then gradually diverging, in lateral view aligned with thecal shaft for much of its length with proximal half or so in line with ventral support; endotheca exposed, soft, entirely fleshy; endothecal ventral support present, very long, almost reaching apices of pseudoparameres, very long (about as long as pseudoparameres); thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesical opening apical on theca. *Male reproductive system* unknown.

*Female dorsal beak* with a developed apical spine or pointed apex (visible in dorsal view). *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. Clearly distinguished from all other Australian genera except *Clinata* by the bowed fore wing costa which is characteristically swollen proximal of node. Fore wing veins M and CuA meet the basal cell with their stems completely fused as one and the hind wing has 3 or 4 apical cells (rarely 5 if aberrant). Unlike *Clinata*, fore wing ulnar cell 1 is clearly longer than ulnar cells 2 and 3.

The male genitalia possess a distinctive aedeagus with a 'trifid' theca exposing a fleshy endotheca, exceedingly long pseudoparameres and an exceedingly long ventral support that almost reaches the distal ends of the pseudoparameres; the only other genus within the Australian fauna possessing a similar aedeagus is *Clinata*.

**Discussion.** Phylogenetic relationships are shown in the cladistic analysis included in the introductory part of this paper. Notes on the distribution and habitat of *T. verna* are provided by Moulds (1990). Notes on seasonal occurrence and plant association of *T. verna* in western Sydney are provided by Emery and Emery (2002) and Emery *et al.* (2005).



**FIGURE 194.** Genus *Toxala* gen.n.: (a) *T. verna* (Distant), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution.

## Review of selected species

### *Toxala verna* comb. n.

*Urabunana verna* Distant, 1912c: 440.

*Curvicicada verna* Chou *et al.*, 1997: 79.

Chou (1997) placed *U. verna* in the genus *Curvicicada* Chou and Lu but the aedeagus clearly differs and *verna* should not be placed there. The aedeagus of *verna* is 'trifid' with an exposed endotheca, while that of *Curvicicada* is tubular with no ventral support or exposed endotheca (at least going by Chou and Lu's figure 8–22). Further, the fore wing costal shape is different, the timbal structure is different, and the number of cells in the hind wing is different.

### Genus *TRYELLA* Moulds

*Tryella* Moulds, 2003: 271–272; Moulds, 2005a: 393, 400, 413, 425, 430, 437; Moulds, 2005b: 133–137; Duffels, 2011: 81.

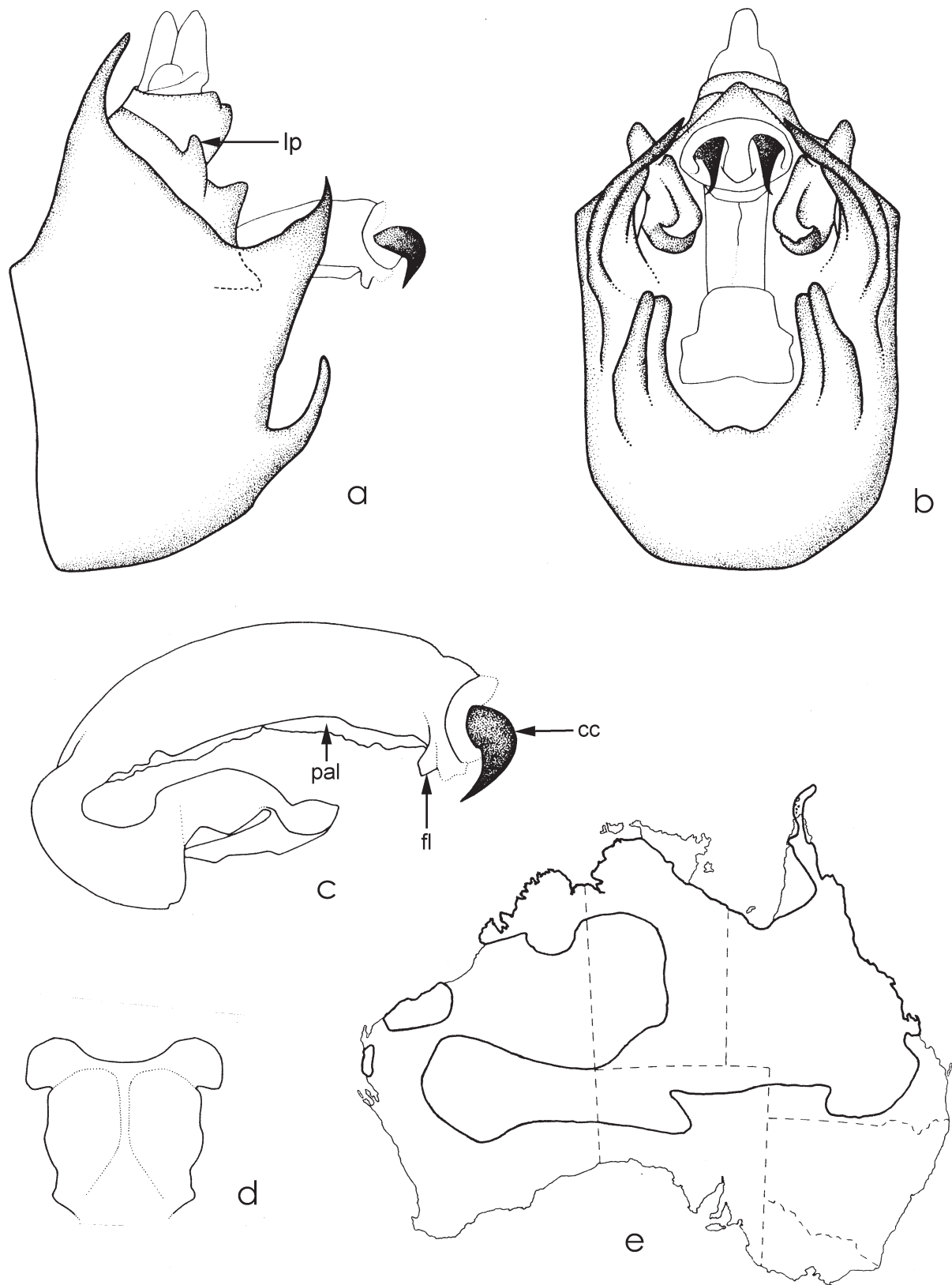
**Type species:** *Tryella ochra* Moulds, 2003, by original designation.

**Included species:** AUSTRALIAN: *adela* Moulds, 2003; *burnsi* Moulds, 2003; *castanea* (Distant 1905); *crassa* Moulds, 2003; *graminea* Moulds, 2003; *infuscata* Moulds, 2003; *kauma* Moulds, 2003; *lachlani* Moulds, 2003; *noctua* (Distant 1913); *occidens* Moulds, 2003; *ochra* Moulds, 2003; *rubra* (Goding & Froggatt, 1904); *stalker* (Distant, 1907); *willsi* (Distant, 1882). OTHERS: none.

**Distribution** (Fig. 195e): Mainly tropical and subtropical Australia, both coastal and inland, but also central Australia, temperate eastern Australia and south-western Papua New Guinea.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; distance between supra-antennal plate and eye about equal to length of antennal plate; postclypeus broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell broad and elongate; costal vein (C) clearly higher than R+Sc; costal margin anterior of costa ampliate, reducing to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no larger than medial cell; veins M and CuA close together at basal cell but clearly not touching; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by cross-vein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation overlaying veins at bases of apical cells 2 and 3 in some species, also sometimes at distal end of vein RA<sub>2</sub>; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* with 6 apical cells; infuscation at distal end of vein 2A spread on wing margin; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less confluent with distal margin of tympanal cavity, inner margin not developed around meracanthus, meeting or almost meeting. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section flat except for upward tilted margin. *Timbal* ribs many (9–10), and regular in size and closely spaced filling entire timbal area apart from basal dome; in lateral view timbals extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 195a–d). Pygofer with distal shoulders not developed; upper lobes flat, well developed, dominating pygofer between basal lobes and dorsal beak, concave on inner face; basal lobes large, in lateral view projecting outwards, basically triangular but sometimes distally elongate, divided creating secondary basal lobe; dorsal beak large and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, widely separated, restraining aedeagus, in ventral view somewhat ladle-like with distal end of each upturned and cupped, in lateral view with a winged lateral process near base. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline, in dorsal view basally divided into two discs with apical arms lobe-like; basal portion of basal plate directed forwards away from thecal shaft; ventral rib rod-like with attachment only at ends; junction



**FIGURE 195.** Genus *Tryella* Moulds: (a) *T. ochra* Moulds, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) generic distribution. *cc* conjunctival claw, *fl* flabellum, *lp* lateral process of uncus, *pal* palparis.

between theca and basal plate rigid, without a 'hinge'; thecal shaft straight or curved in a gentle arc; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum present in some species, palearis present in some species; conjunctival claws present, directed laterally or ventrally; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female* abdominal segment 9 long, nearly conical; ovipositor sheath terminating level with or just beyond apex of dorsal beak. *Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small to medium-sized cicadas. Distinguished from other Australian genera except *Aleeta* by lacking timbal covers and having the fore wing costal margin ampliate to the node, the maximum dilation clearly wider than the costal vein. Differs from *Aleeta* mainly in the male genitalia but also mostly in size, the fore wing never reaching 32 mm in length, usually under 26 mm; that of *Aleeta* is rarely below 32 mm, usually over 40 mm.

Male genitalia are very distinctive; the claspers are upturned at their distal ends and somewhat ladle-like while basally the claspers possess a lateral process clearly visible in lateral view. Further, the conjunctival claws are very well developed. *Tryella* is the only Australian genus which includes species with a palearis.

**Discussion.** Phylogenetic relationships of this genus are shown in the cladistic analysis of Moulds (2005a) based on the type species *T. ochra*. The species of the genus have been reviewed in detail by Moulds (1990, 2003) but note that the structures referred to as uncal lobes in Moulds (2003) are in fact claspers (see Moulds 2005a for discussion of homologies). Analyses of the songs of some species are available in Moulds (2005b). Ewart (2005b, 2009a) provides notes on *T. lachlani* and *T. graminea* respectively, including analyses of their songs. Notes on *T. willsi* are provided by Ewart & Popple (2001) and Popple & Strange (2002).

### Genus *URABUNANA* Distant

*Urabunana* Distant 1905g: 274, 269; Distant, 1906d: 163, 181; Distant, 1911: 137; Ashton, 1912b: 27; Ashton, 1914a: 356; Kato, 1932: 38, 111, 385, 386; Chen, 1933: 40; Imhof, 1933: 307; Wu, 1935: 27; Ouchi, 1938: 108; Neave, 1940b: 614; Chen, 1943: 37; Metcalf, 1947: 163; Kato, 1956: 25; Burns, 1957: 668; Metcalf, 1963: 416; Dugdale, 1972: 877, 880; Duffels and van der Laan, 1985: 298; Moulds, 1990: 173; Moulds, 2005a: 390, 430, 436.

**Type species:** *Cicada sericeivitta* Walker, 1862, by original designation.

**Included species:** AUSTRALIAN: *sericeivitta* (Walker, 1862). OTHERS: none.

**Excluded species:** The following are transferred to other genera as listed.

*festiva* Distant, 1907, to *Mugadina* **gen. n.**, *q.v.*

*leichardti* (Distant, 1882), to *Paradina* **gen. n.**, *q.v.*

*longipennis* Ashton, 1914, to *Uradolichos* **gen. n.**, *q.v.*

*marshalli* Distant, 1911, to *Mugadina* **gen. n.**, *q.v.*

*segmentaria* Distant, 1905, junior synonym of *Mugadina leichardti*, *q.v.*

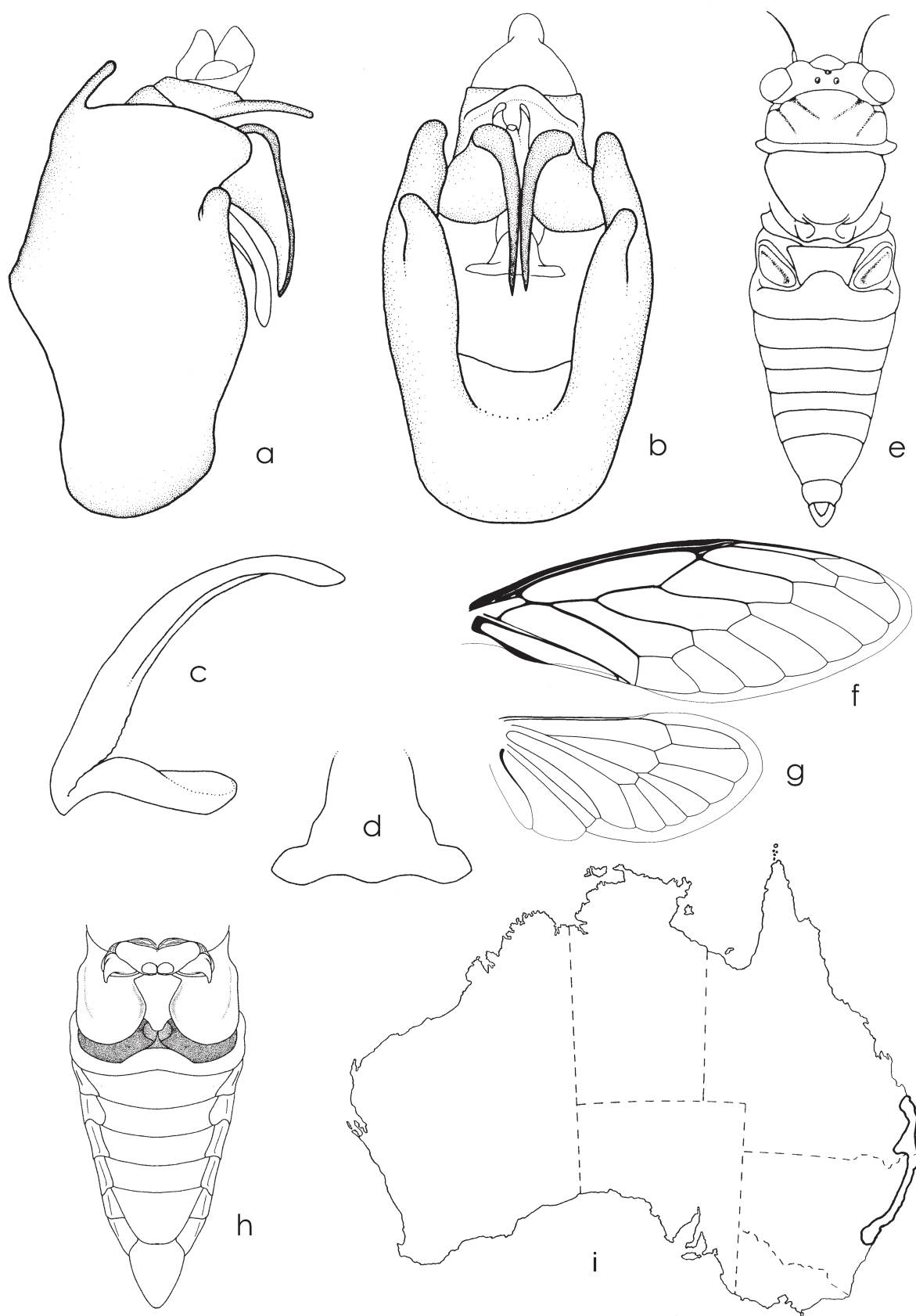
*verna* Distant, 1912, to *Toxala* **gen. n.**, *q.v.*

*wollomombii* Coombs, 1995, to *Myopsalta* **gen. n.**, *q.v.*

**Distribution** (Fig. 196i): South-eastern Queensland and eastern New South Wales between Bundaberg and Sydney.

**Diagnosis.** *Head* including eyes wide, clearly wider than mesonotum; supra-antennal plate nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 196f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting at basal cell and stems completely fused as one for part of their length; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 196g) with 5 apical cells (sometimes 4 or 6 if aberrant, but usually only in one wing); no infuscation on ambient vein; width of 1st cubital cell at distal end at





**FIGURE 196.** Genus *Urabunana* Distant: (a) *U. sericeivitta* (Walker), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, male head and body, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) underside of male body showing opercula; (i) generic distribution.

least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 196h) not quite reaching distal margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, almost meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Figs 196e, h) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VII in cross-section convex. *Timbal* covers absent; timbal ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases.

*Male genitalia* (Figs 196a–d). Pygofer with distal shoulders not developed; upper lobes flat, moderately developed, set well away from dorsal beak, rounded; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate with a functional 'hinge' that is small and substantially compressed between the theca and basal plate in lateral view; thecal shaft curved in a gentle arc; pseudoparameres present, lateral of theca, dorsally fused almost to their apices; endotheca exposed, rigid, weakly sclerotised; endothecal ventral support absent; thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Very small cicadas. Distinguished from other genera by having the following combination of characters: head including eyes wide, clearly wider than mesonotum; fore wing veins M and CuA meet at basal cell with their stems completely fused as one; hind wings usually with 5 apical cells; dorsal beak of male pygofer and of female abdominal segment 9 small, finger-like, parallel-sided and not flanged at base.

The male genitalia have a very distinctive aedeagus with pseudoparameres that are very broad in lateral view and fused almost to the apex of the endotheca, and there is no ventral support for the endotheca.

**Discussion.** Phylogenetic relationships of this monotypic genus are shown in the cladistic analysis of Moulds (2005a). The single included species has been reviewed by Moulds (1990).

### Genus *URADOLICHOS* gen. n.

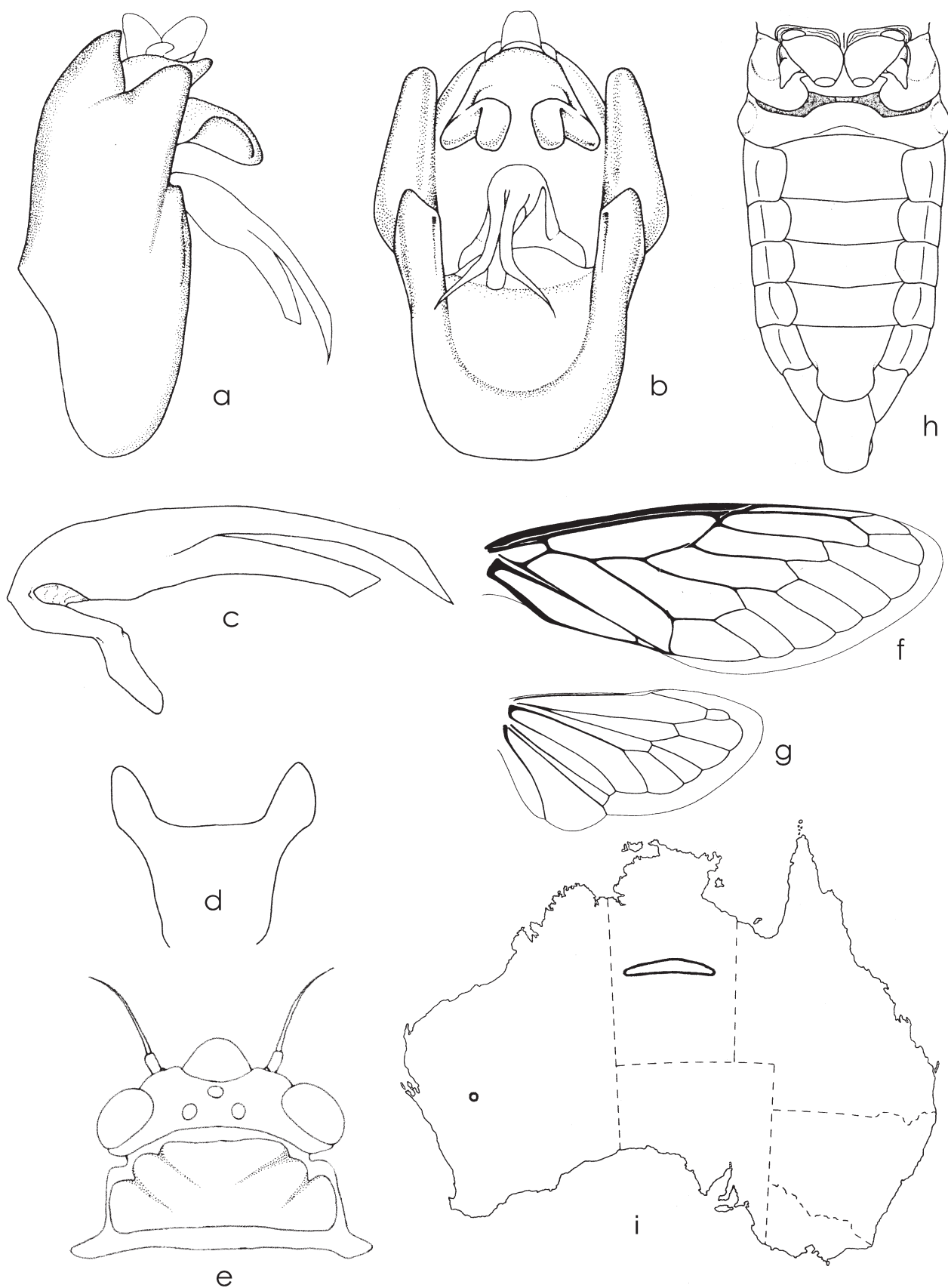
**Type species:** *Urabunana longipennis* Ashton, 1914 (Pl. 2, figs 12a, 12b).

**Included species:** AUSTRALIAN: *longipennis* (Ashton, 1914), **comb. n.** OTHERS: none.

**Etymology.** Derived from the Greek *dolichos*, meaning long and referring to the elongate body, especially of males. Feminine.

**Distribution** (Fig. 197i): Known only from the Tennant Creek area, Northern Territory.

**Diagnosis.** *Head* (Fig. 197e) including eyes narrower than mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus in dorsal view protruding and not confluent with front of head, broadly rounded transversely across ventral midline, in lateral profile rounded between 'top' and 'sides'. *Thorax* (Fig. 197e): pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 197f) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one, rarely independently; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest (sometimes near equal, rarely distal portion shortest); veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 197g) with 5 apical cells (sometimes 4 or 6 if aberrant, but usually only in one wing), the first cell usually very much smaller than the remainder; infuscation at distal end of vein 2A absent; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M



**FIGURE 197.** Genus *Uradolichos* gen.n.: (a) *U. longipennis* (Ashton), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, head and prothorax, dorsal view; (f) the same, fore wing; (g) the same, hind wing; (h) the same, underside of male body showing opercula; (i) generic distribution.

fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 197h) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 197h) in cross-section with sides of tergites convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* ribs more or less regular in width, usually 4 in number, short ribs indistinct; very large basal dome; timbals extending below wing bases; timbal covers absent.

*Male genitalia* (Figs 197a–d). Pygofer unusually narrow in lateral view; distal shoulders not developed; upper lobes very flat, very well developed, dominating pygofer between basal lobes and dorsal beak, elongate and usually expanded apically like a pair of horse blinkers; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view tending to be apically broadened with 'ears'; basal portion of basal plate directed forwards away from thecal shaft; ventral rib ridge-like, completely fused with basal plate; junction between theca and basal plate with a functional 'hinge'; thecal shaft curved in a gentle arc; pseudoparameres present, dorsal of theca and originating near thecal base; endotheca exposed, ridged, entirely chitinized; endothecal ventral support absent; thecal apex entirely chitinized, thecal sub-apical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Small cicadas. The pronotum is narrower than the mesonotum, and the postclypeus is large and protruding so that in dorsal view it is not confluent with the front margin of the head and there are typically 5 hind wing apical cells (4 or 6 in aberrant specimens). Males (Pl. 2, fig. 12a) have an abdomen that is nearly cylindrical, almost parallel-sided and about the same width as the mesonotum. Females (Pl. 2, fig. 12b) are similar to males but with a considerably longer abdomen.

The male genitalia have an unusually shaped pygofer that is very narrow in lateral view and wide in ventral view, the upper pygofer lobes are large, the claspers are parrot-beak like and the exposed endotheca is strongly sclerotized.

### Genus *VENUSTRIA* Goding and Froggatt

*Venustria* Goding and Froggatt, 1904: 596, 565; Distant, 1906d: 128, 129; Horváth, 1913: 429; Ashton, 1914a: 349; Delétang, 1923: 628; Kato, 1932: 179; Neave, 1940b: 634; Kato, 1956: 69; Burns, 1957: 634; Metcalf, 1963: 203; Duffels and van der Laan, 1985: 233; Moulds, 1990: 32, 180; de Boer, 1990: 64; de Boer, 1991: 2, 3; de Boer, 1992a: 164; de Boer, 1992b: 19; de Boer, 1993a: 16, 17; de Boer, 1993b: 142; de Boer, 1994a: 3; de Boer, 1994c: 130; de Boer, 1995a: 1, 3, 4, 8, 11; de Boer, 1995b: 204, 211, 214, 215, 218; de Boer, 1995c: 2, 5; de Boer, 1995d: 218, 222, 224, 225, 233; de Boer, 1996: 352; de Boer and Duffels, 1996a: 156, 168, 170, 171, 172, 173; de Boer and Duffels, 1996b: 301, 304; de Boer, 1997: 91, 92, 93, 94, 109; Moulds, 2005a: 390, 407, 412, 422, 430, 435.

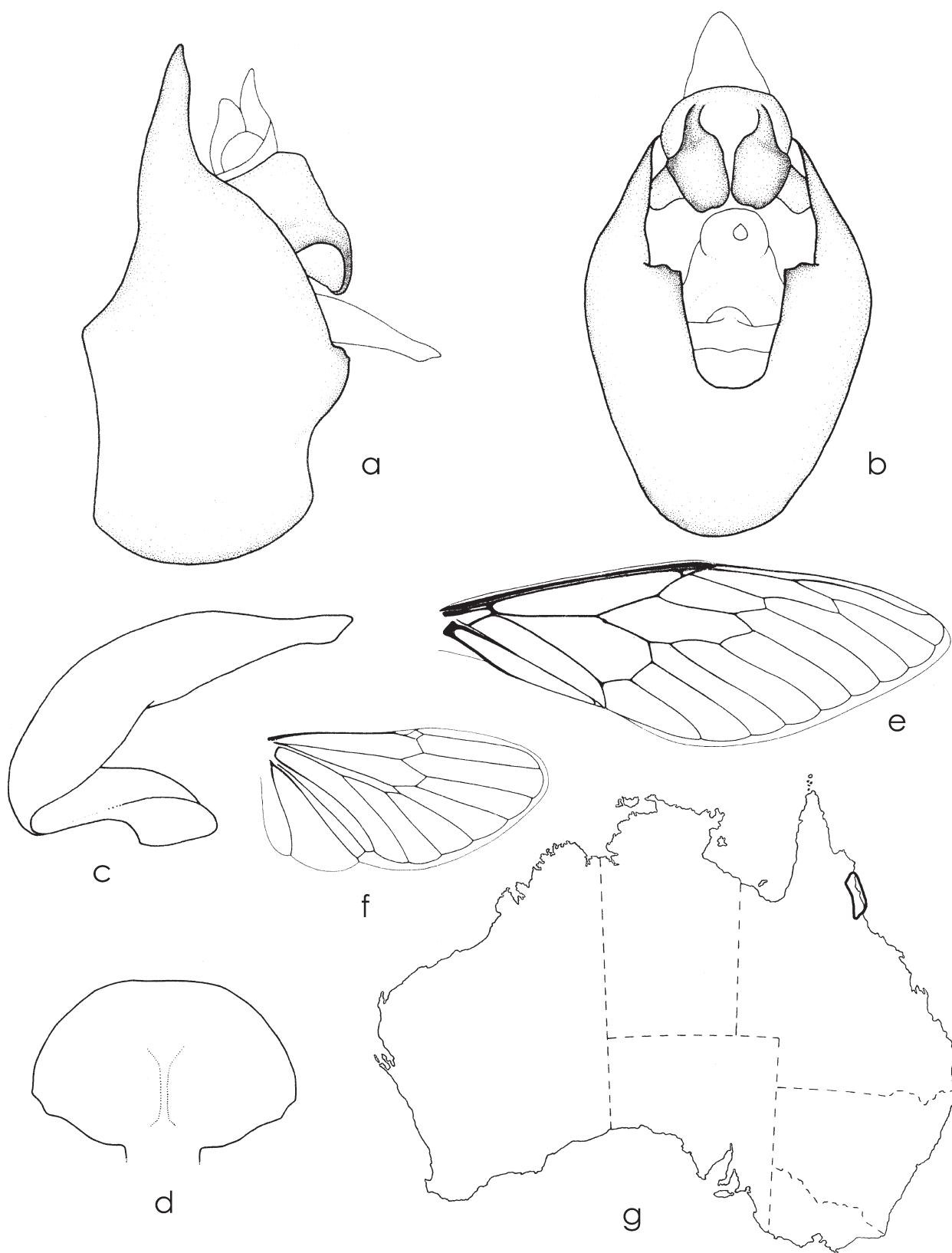
*Venustra* [sic]; Kato, 1932: 181 (misspelling).

**Type species:** *Venustria superba* Goding and Froggatt, 1904, by original designation.

**Included species:** AUSTRALIAN: *superba* Goding and Froggatt, 1904. OTHERS: none.

**Distribution** (Fig. 198g): North-eastern Queensland from near Cooktown to the Kirrama Range northwest of Cardwell.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus transversely angulate along ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 198e) hyaline but weakly tinted light brown; with 9 apical cells (sometimes 8 if aberrant but usually only in one wing), mostly larger than ulnar cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma absent; vein CuA only weakly bowed so that cubital cell no broader than medial cell; veins M and CuA



**FIGURE 198.** Genus *Venustria* Goding and Froggatt: (a) *V. superba* Goding and Froggatt, male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at top; (e) the same, fore wing; (f) the same, hind wing; (g) generic distribution.



close together or sometimes touching at basal cell; vein RA<sub>1</sub> diverging from Sc in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 198f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, basal portion (remnant of epimeron 3) raised and bubble-like. *Male abdomen* in cross-section with sides of tergites straight or weakly convex, lateroventrally rounded to ventral surface; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites III–VII in cross-section convex. *Timbal* ribs many, regular in size and closely spaced filling entire timbal area apart from basal dome; basal dome small; in lateral view timbals extended below wing bases; timbal covers absent.

*Male genitalia* (Figs 198a–d). Pygofer with distal shoulders not developed; upper lobes absent; basal lobes undivided, ill-defined, substantially transverse and ridge-like; dorsal beak present and a part of chitinized pygofer. Uncus absent. Claspers large, dominant, closely aligned restraining aedeagus. Aedeagus with basal plate in lateral view undulated, weakly depressed on dorsal midline; in dorsal view short, near oval; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge'; thecal shaft 'S' shaped; pseudoparameres absent; thecal apex entirely chitinized, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening apical on theca. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; length of accessory glands unknown.

**Distinguishing characters.** Medium-sized cicadas. The nine long apical cells of the fore wing (mostly much longer than the ulnar cells) and the distinct but subtle brown suffusion of the distal half of the fore wings immediately separates this genus from all other Australian Chlorocystini. Likewise, *Venustria* is unique in having a very long vein 3A in the hind wing, nearly three quarters the length of 2A.

The male pygofer possesses a very large dorsal beak and characteristic basal lobes that are substantially transverse and ridge-like.

**Discussion.** Phylogenetic relationships of this monotypic genus are documented by de Boer (1995a, 1995b) and Moulds (2005a). De Boer (1995a, 1995b) considered the possibility of absorbing *Venustria* into *Gymnotympana*. While the phylogenetic position of *Venustria* is ambiguous, the swollen shape of the basal part of the male operculum (remnant of epimeron 3) does suggest a monophyletic relationship with the two Australian species of *Gymnotympana*, and the thorn-like ventral protrusion of the female abdominal segment 9 is possibly homologous with a similar, but much smaller, protrusion in *G. rufa*. However, de Boer refrained from disbanding *Venustria* as no unambiguous synapomorphy could be found for *Venustria* plus *Gymnotympana*. The generic status of *Venustria* is, in fact, well supported by the distinguishing attributes listed above and I strongly support de Boer in recognizing *Venustria*.

In de Boer's phylogenetic analysis of the Chlorocystini (de Boer 1995b), *Venustria* and *Gymnotympana* are sister clades. Further notes on the phylogenetic relationships of *Venustria* can be found in Moulds (2005a) where *Venustria* (as *V. superba*) is identified as the sister genus to the rest of the Australian Chlorocystini.

Moulds (1990) provides a detailed distribution and notes on the biology of the single known species in this genus.

### Genus *YOYETTA* gen. n.

**Type species:** *Cicadetta celis* Moulds, 1988.

**Included species:** AUSTRALIA: *aaede* (Walker, 1850), **comb. n.**; *abdominalis* (Distant, 1892), **comb. n.**; *celis* (Moulds, 1988), **comb. n.**; *denisoni* (Distant, 1893), **comb. n.**; *hunterorum* (Moulds, 1988), **comb. n.**; *incepta* (Walker, 1850), **comb. n.**; *landsboroughi* (Distant, 1882), **comb. n.**; *toowoombae* (Distant, 1915), **stat.rev., comb. n.**; *tristrigata* (Goding and Froggatt, 1904), **comb. n.** OTHERS: none.

**Distribution** (Fig. 199h): Eastern Queensland south from the Atherton Tablelands, the coast and mountains of NSW, the eastern half of Victoria and along the Murray River to South Australia north to the Flinders Ranges and in Tasmania.

**Etymology.** Derived from the Latin *aureum* meaning yellow, and referring to the colour of the lateral abdomen of many species. Feminine.

**Diagnosis.** *Head* including eyes about as wide as mesonotum; supra-antennal plate meeting or nearly meeting eye; postclypeus broadly rounded transversely across ventral midline, in lateral profile angulate between 'top' and 'sides'. *Thorax*: pronotal collar width at dorsal midline much less than diameter of eyes; paranota confluent with adjoining pronotal sclerites, no mid lateral tooth except sometimes in the *tristrigata* complex; cruciform elevation with its dome wider than long; epimeral lobe not reaching operculum. *Fore wings* (Fig. 199e) hyaline; with 8 apical cells; subapical cells absent; ulnar cell 3 angled to radial cell; basal cell long and narrow; costal vein (C) clearly higher than R+Sc; costa parallel-sided to node; pterostigma present; vein CuA only weakly bowed so that cubital cell no wider than medial cell; veins M and CuA meeting basal cell with their stems completely fused as one; vein RA<sub>1</sub> aligned closely with Sc for its length and not diverging in subapical region; vein CuA<sub>1</sub> divided by crossvein m-cu so that proximal portion shortest; veins CuP and 1A fused in part; infuscation absent; wing outer margin developed for its total length, never reduced to be contiguous with ambient vein. *Hind wings* (Fig. 199f) with 6 apical cells; no infuscation on ambient vein; width of 1st cubital cell at distal end at least twice that of 2nd cubital cell; anal lobe broad with vein 3A curved, long, separated from wing margin; veins RP and M fused basally. *Fore leg* femoral primary spine erect. *Male opercula* (Fig. 199g) more or less reaching margin of tympanal cavity, directed towards distomedial margin of tympanal cavity, apically broadly rounded, clearly not meeting, clearly raised above level of tympanal cavity on its outer half or so. *Male abdomen* (Fig. 199g) in cross-section with sides of tergites straight or weakly convex, epipleurites reflexed ventrally from junction with tergites; tergites 2–7 all similar in size (2 and 3 not considerably larger); sternites IV–VI in cross-section convex. *Timbal* ribs irregular in size and spaced with prominent intermediate short ribs; basal dome very large; timbals not extended below wing bases; timbal covers absent.

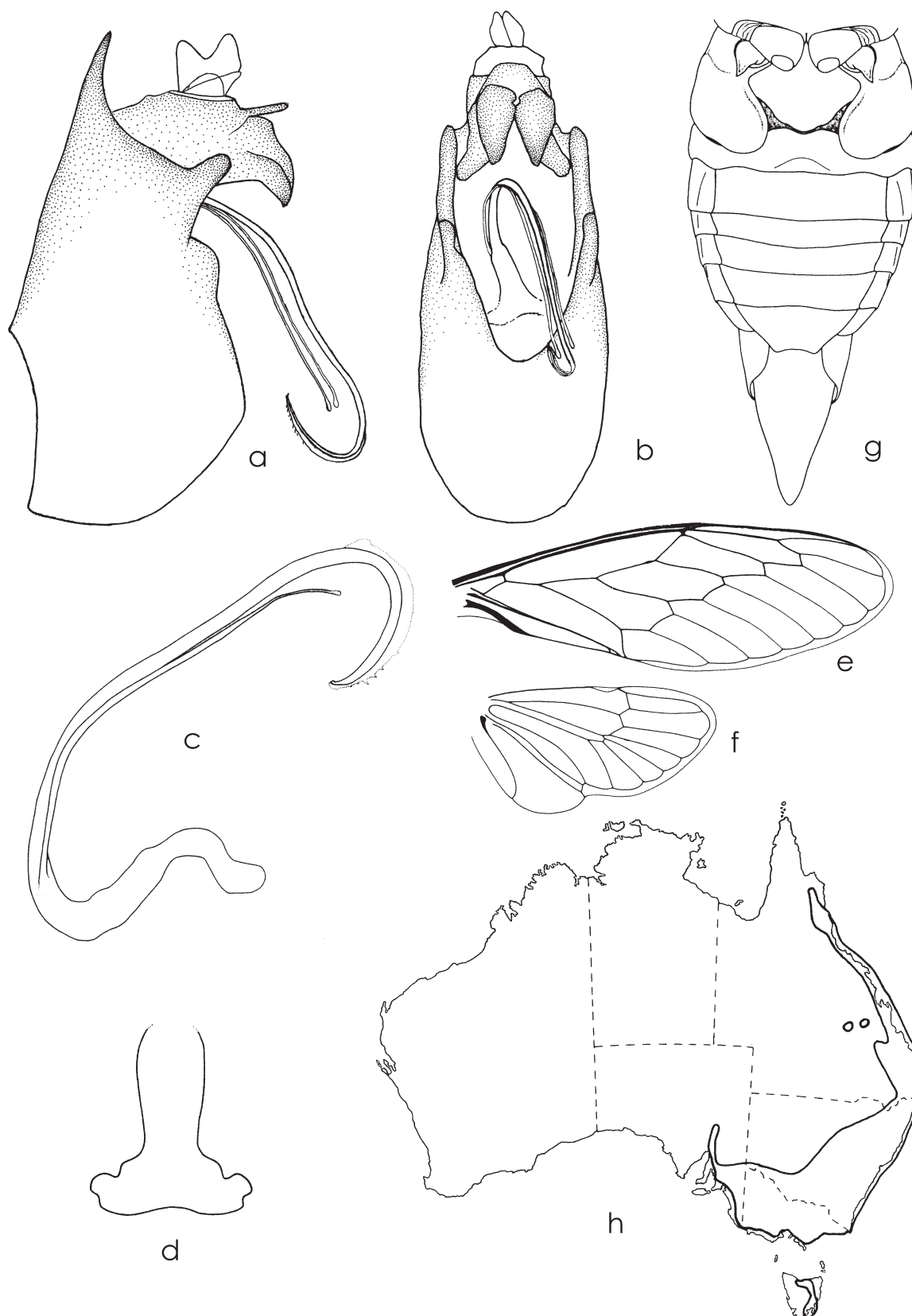
*Male genitalia* (Figs 199a–d). Pygofer with distal shoulders not developed; upper lobes flat, well developed, dominating pygofer between basal lobes and dorsal beak; basal lobes undivided, moderately developed, tending to be broadly rounded in lateral view; dorsal beak present and a part of chitinized pygofer, well developed. Uncus small, short, flattened, more or less duck-bill shaped. Claspers well developed, large, dominant, lobe-like, restraining aedeagus. Aedeagus with basal plate in lateral view downturned at distal end; in dorsal view T-shaped; basal portion of basal plate directed forwards away from thecal shaft; ventral rib completely fused with basal plate; junction between theca and basal plate rigid, without a 'hinge', without an obvious junction between the two; thecal shaft curved in a gentle arc, the apical quarter or so U-turned through 180°; pseudoparameres present, entirely lateral of theca, filiform or nearly so; thecal apex partly or entirely fleshy, thecal subapical cerci absent; flabellum absent; conjunctival claws absent; vesica retractable, vesical opening dorsal on theca, linear. *Male reproductive system* unknown.

*Female reproductive system* ditrysian; accessory glands of common oviduct long, longer than common oviduct.

**Distinguishing characters.** Small cicadas. Distinguished from most Australian genera by the following combination of characters: head about as wide as mesonotum, fore wings with veins M and CuA meeting basal cell with their stems completely fused as one, hind wings with six apical cells, no infuscation at distal end of vein 2A and the 2nd cubital cell considerably larger than the 1st anal cell.

Males have a characteristic aedeagus that is long and thin, turned through 180° in a broad arc distally and which markedly protrudes from the pygofer (clearly visible in dead dried specimens). Further, the pseudoparameres are slender and long, reaching to about the start of the 180° turn of the theca. The claspers are robust; in ventral view tapering to a blunt point, basally adjacent, apically wide apart; in lateral view excavated below about midpoint.

**Discussion.** Phylogenetic relationships of the genus (represented by the type species *celis*) can be found in Moulds (2005a). Moulds (1990) summarises the distribution and biology for most species of this genus. Notes on seasonal occurrence and plant associations of three described species and four undescribed species in western Sydney are provided by Emery *et al.* (2005). Further notes on the species of this genus, including song analyses, are provided by Arensburg, *et al.* (2004a), Buckley, *et al.* (2002), Coombs (1993b, 1996), Dunn (1991, 1992), Ewart (1998a), Ewart & Popple (2001), Moss (1989) and Popple & Strange (2002).



**FIGURE 199.** Genus *Yoyetta* gen.n.: (a) *Y. celis* (Moulds), male genitalia, lateral view; (b) the same, male genitalia, ventral view; (c) the same, aedeagus, lateral view; (d) the same, basal plate, dorsal view, apex at bottom; (e) the same, fore wing; (f) the same, hind wing; (g) underside of male body showing opercula; (h) generic distribution.

## Acknowledgments

I am grateful to Dr Hans Duffels, Dr Bruce Halliday, Prof. M. Hayashi, Dr D.K. McAlpine and the late Dr C.N. Smithers for discussion and guidance concerning morphological interpretation and nomenclature. Dr M. Coombs, Ms Sally Cowan, Prof. A. Ewart, Ms Kathy Hill, Dr M. Humphrey, Dr D. Marshall, Dr J. Moss, Mr J. Olive, Dr A.G. Orr, Dr L. Popple, Dr D.C.F. Rentz, Dr Norma Scott and Mr Gary Wilson provided valuable comments on the manuscript and/or trialed the key to genera; in particular very special thanks go to Norma Scott and Tony Ewart for the numerous hours they dedicated to testing the key, and to Kathy Hill and Tony Ewart for their extensive comments on the finished manuscript as official reviewers. For guidance on cladistic matters I thank Dr John Trueman. Without the help of all these people this work would not have met expectations.

I am especially grateful also to the following for drawing and inking figures: Sally Beech, Hannah Finlay, Kyra Kopestonsky, Ivan Nozaic and Judy Thompson; all patiently tolerated my often over-zealous critical eye. Charlotte Brogden and Geoff Avern (AM) gave generous assistance with photomicroscopy. Michel Boulard, David Emery, Tony Ewart, Peter Hudson, Lindsay Popple, David Rentz and Mick Webb provided images for the text figures and/or colour plates.

I am indebted to the librarians and staff of the Australian Museum, Sydney; The Natural History Museum, London; CSIRO Black Mountain Laboratories, Canberra, the Royal Society of South Australia, Adelaide, and North Carolina State University, Raleigh, for access to, or for providing copies of, literature in their care. Further, I wish to thank John Cooley, Hans Duffels, Ted Edwards, Kathy Hill, Murray Fletcher, Masami Hayashi and Chris Simon for providing photocopies of literature.

This study would not have been possible without an extensive reference collection; for helping make such a collection possible I am indebted to Barbara and Timothy Moulds who accompanied me on numerous field trips over many years. A special thanks also to Kathy Hill and Dave Marshall who accompanied me on many other field trips across Australia. To others who have provided specimens I also extend my sincere gratitude, in particular to the late Ernest Adams, John Cooley, Sally Cowan, Greg Daniels, George Davis, Roger De Keyser, Rod Eastwood, David Emery, Angus Emmott, Rob and Margaret Evans, Tony Ewart, Laurie Greenup, George Hangay, Mark Hanlon, Jack and Sue Hasenpusch, Brian Haywood, Paul Hutchinson, the late Sheila Hunter, Rob Lachlan, David Lane, John Moss, John Olive, Michael Powell, David Rentz, Susan Robertson, Danae, Josef and Warwick Schofield, Chris Simon, Stephen Smith, Alan Sundholm, Allen Walford-Huggins, Geoff Williams, Matt Williams and Terry Woodger; together they have collected numerous important specimens over many years. In addition David Emery, Barry Day, John Olive, John Moss and Chris Simon generously provided frozen specimens for dissection.

I thank the curators of the following collections for access to material in their care: ANIC (Mary Carver and Tom Weir); BMNH (Janet Margerison-Knight and Mick Webb); HOPE (Zoë Simmons); MHUB (Jürgen Deckert); MM (Margaret Humphrey); MNHN (Michel Boulard); MV (Catriona McPhee and Ken Walker); QM (Geoff Monteith and Christine Lambkin); SAM (Jan Forrest and Peter Hudson); UZMC (Niels Anderson); WAM (Terry Houston) and ZMH (Prof. H. Strümpel).

This project was substantially supported during postgraduate studies by the Department of Crop Sciences, Faculty of Agriculture, University of Sydney in particular by an Australian Postgraduate Research Award and a Norman Scott Noble Scholarship. For additional financial assistance I especially thank the Linnean Society of New South Wales for a Joyce Vickery Research Award, the National Science Foundation (grant numbers DEB 05-29679, DEB 07-20664 and DEB 09-55849) and the Australian Museum. Ok Tedi Mining Limited and Lihir Gold Limited provided valuable support in kind. Without such assistance this project would not have been possible.

For collecting permits I thank National Parks and Wildlife Service, NSW; Forestry Commission of NSW; National Parks, Northern Territory; Department of Forestry, Queensland, National Parks and Wildlife Service, Queensland, and Department of Conservation and Land Management, Western Australia. The task of typing the manuscript was largely undertaken by Sally Cowan and Barbara Moulds; I thank both for their many hours of work.



## References

- Adams, H. (1860) Description of a new genus and species of mollusk. *Proceeding of the Zoological Society of London*, 28, 241–243.
- Agassiz, J.L.R. (1848) *Nomenclatoris zoologici index universalis, continens nomina systematica classium, ordinum, familiarum et generum animalium omnium, tam viventium quam fossilium, secundum ordinem alphabeticum unicum disposita, adjectis homonymiis plantarum*. Pp. i–x, 1–1135. [A revision of *Nomenclator zoologicus*; see Agassiz, J.L.R., Erichson, W.F. and Germar, E.F., 1842, 1846.]
- Agassiz, J.L.R., Erichson, W.F. and Germar, E.F. (1842) Nomina systematica generum Hemipterorum, tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris in quibus reperiuntur, anno editionis, etymologia, et familiis, ad quas pertinent. In: Agassiz, J.L.R. et al., *Nomenclator zoologicus, continens nomina systematica generum animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris, in quibus reperiuntur, anno editionis, etymologia et familiis, ad quas pertinent, in singulis classibus*. Pp. i–v, 1–20.
- Agassiz, J.L.R., Erichson, W.F. and Germar, E.F. (1846) Hemiptera. (Addenda et corrigenda). In: Agassiz, J.L.R. et al., *Nomenclator zoologicus, continens nomina systematica generum animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris, in quibus reperiuntur, anno editionis, etymologia et familiis, ad quas pertinent, in singulis classibus*. Pp. 1–16.
- Aidley, D.J. and White, D.C.S. (1969) Mechanical properties of glycerinated fibers from the timbal muscles of a Brazilian cicada. *Journal of Physiology, London*, 205, 179–192, pl. 1.
- Amyot, C.J.B. (1847) Entomologie française. Rhynchotes. Méthode monomymique. Ordre deuxième, Homoptères. Homoptera. Latr. *Annales de la Société entomologique de France*, (2)5, 143–238.
- Amyot, C.J.B. and Serville, J.G.A. (1843) *Histoire Naturelle des Insects. Hémiptères*. Text, pp. i–lxxvi, 1–675. Atlas, pls 1–12.
- Arensburger P., Buckley, T.R., Simon, C., Moulds, M.S. and Holzinger, K.E. (2004a) Biogeography and phylogeny of the New Zealand cicada genera (Hemiptera: Cicadidae) based on nuclear and mitochondrial DNA data. *Journal of Biogeography*, 31, 557–569.
- Arensburger P., Simon, C. and Holsinger, K.E. (2004b) Evolution and phylogeny of the New Zealand cicada genus *Kikihia* Dugdale (Homoptera: Auchenorrhyncha: Cicadidae) with special reference to the origin of the Kermadec and Norfolk Islands' species. *Journal of Biogeography*, 31, 1769–1783.
- Ashton, J.H. (1912a) Some new Australian Cicadidae. *Proceedings of the Royal Society of Victoria* (n.s.)24, 221–229, pls XLIX–LI.
- Ashton, J.H. (1912b) Catalogue of the Victorian Cicadidae in the National Museum, Melbourne. *Memoirs of the National Museum of Victoria*, 4, 23–29, pl. IV. [Separate paginated 1–7]
- Ashton, J.H. (1912c) Descriptions of new Australian Cicadidae in the National Museum, Melbourne. *Memoirs of the National Museum of Victoria*, 4, 30–32, pl. 4.
- Ashton, J.H. (1912d) Notes on Australian Cicadidae. *Records of the Australian Museum*, 9(1), 76–80, pl. VII.
- Ashton, J.H. (1912e) Description of a new cicada. *Records of the Australian Museum*, 9(1), 105a–106b.
- Ashton, J.H. (1914a) Catalogue of the Cicadidae in the South Australian Museum with descriptions of several new species. *Transactions and Proceedings of the Royal Society of South Australia*, 38, 345–358, pl. XVII.
- Ashton, J.H. (1914b) Notes of Australian Cicadidae. *Proceedings of the Royal Society of Victoria*, (n.s.)27, 12–14, pl. II.
- Ashton, J.H. (1915) Synonymic notes on a recent catalogue of Cicadidae in the South Australian Museum. *Transactions and Proceedings of the Royal Society of South Australia*, 39, 91.
- Ashton, J.H. (1921) A revision of the Australian Cicadidae. Part 1. *Proceedings of the Royal Society of Victoria*, (n.s.)33, 87–107.
- Atkinson, E.T. (1884) Notes on Indian Rhynchota, No. 1. *Journal of the Asiatic Society of Bengal*, 53, 210–233.
- Atkinson, E.T. (1886) Notes on Indian Rhynchota, No. 6. Addenda and Index. *Journal of the Asiatic Society of Bengal*, 55, 143–223.
- Bashford, R. (1997) Records of insects associated with *Acacia dealbata* Link. in Tasmania. *Australian Entomologist*, 24, 109–115.
- Bekker-Migdisova, E.F. (1949) [Mesozoic Homoptera from Middle Asia]. *Trudy Paleontologicheskago Instituta Akademii Nauk SSSR*, 22, 1–68, 1 plate.
- Bennet-Clark, H.C. (1997) Tymbal mechanics and the control of song frequency in the cicada *Cyclochila australasiae*. *Journal of Experimental Biology*, 200, 1681–1694.
- Bennet-Clark, H.C. (1999) Resonators in insect sound production: how insects produce loud pure-tone songs. *Journal of Experimental Biology*, 202, 3347–3357.
- Bennet-Clark, H.C. and Daws, A.G. (1999) Transduction of mechanical energy into sound energy in the cicada *Cyclochila australasiae*. *Journal of Experimental Biology*, 202, 1803–1817.
- Bennet-Clark, H.C. and Young, D. (1992) A model of the mechanism of sound production in cicadas. *Journal of Experimental Biology*, 173, 123–153.
- Bennet-Clark, H.C. and Young, D. (1994) The scaling of song frequency in cicadas. *Journal of Experimental Biology*, 191, 291–294.



- Bennet-Clark, H.C. and Young, D. (1998) Sound radiation by the bladder cicada *Cystosoma saundersii*. *Journal of Experimental Biology*, 201, 701–715.
- Bergroth, E. (1911) On some recently described Hemiptera chiefly from India. *Annales de la Société entomologique de Belgique*, 55, 184–189.
- Blanchard, E. (1846) *Dictionnaire universel d'histoire naturelle etc.* Edited by Charles d'Orbigny. 4, 1–752. [A multi-authored work of which Blanchard wrote the insects].  
For date of publication see Sherborn, C.D. and Palmer, T.S., 1899, *Annals and Magazine of Natural History*, (7)3, 350–352. The entire work re-issued in 1861 with new title pages, Houssiaux & Co., Paris. Revised edition, containing one additional volume, c. 1867.
- Blanchard, E. (1848a) *Dictionnaire universel d'histoire naturelle etc.* 11, 1–816. [A multi-authored work of which Blanchard wrote the insects. For footnote see Blanchard, E., 1846.]
- Blanchard, E. (1848b) *Dictionnaire universel d'histoire naturelle etc.* 12, 1–816. [A multi-authored work of which Blanchard wrote the insects. For footnote see Blanchard, E., 1846.]
- Blöte, H. C. (1960) The genus *Baeturia* Stål as represented in New Guinea (Homoptera, Cicadidae). *Zoologische Mededeelingen, Leiden*, 37, 61–80.
- Boer, A.J. de (1990) *Aedeastria*, a new cicada genus from New Guinea, its phylogeny and biogeography (Homoptera, Tibicinidae), preceded by a discussion on the taxonomy of New Guinean Tibicinidae. *Beaufortia*, 40, 63–72.
- Boer, A.J. de (1991) *Scottotympana*, a new cicad genus from New Guinea, with the description of three new species, their taxonomy and biogeography (Homoptera, Tibicinidae). *Beaufortia*, 42, 1–11.
- Boer, A.J. de (1992a) The taxonomy and biogeography of the *viridis* group of the genus *Baeturia* Stål, 1866 (Homoptera, Tibicinidae). *Bijdragen tot de Dierkunde*, 61, 163–183.
- Boer, A.J. de (1992b) The taxonomy and biogeography of the genus *Thaumastopsaltria* Kirkaldy, 1900 (Homoptera, Tibicinidae). *Beaufortia*, 43, 17–44.
- Boer, A.J. de (1993a) *Guineapsaltria*, a new genus of the Australian – New Guinean region (Homoptera, Tibicinidae), with notes on its taxonomy and biogeography. *Bijdragen tot de Dierkunde*, 63(1), 15–41.
- Boer, A.J. de (1993b) Ten species added to the genus *Aedeastria* Boer, 1990, with the description of eight new species and notes on the taxonomy and biogeography (Homoptera, Tibicinidae). *Beaufortia*, 43, 140–167.
- Boer, A.J. de (1994a) The taxonomy and biogeography of the *loriae* group of the genus *Baeturia* Stål, 1866 (Homoptera, Tibicinidae). *Tijdschrift voor Entomologie*, 137, 1–26.
- Boer, A.J. de (1994b) The taxonomy and biogeography of the *guttulinervis* group of the genus *Baeturia* Stål, 1866 (Homoptera, Tibicinidae). *Bijdragen tot de Dierkunde*, 64, 87–100.
- Boer, A.J. de (1994c) The taxonomy and biogeography of the *exhausta* group of the genus *Baeturia* Stål, 1866 (Homoptera, Tibicinidae). *Beaufortia*, 44, 127–158.
- Boer, A.J. de (1995a) The taxonomy, phylogeny and biogeography of the cicada genus *Gymnotympana* Stål, 1861 (Homoptera: Tibicinidae). *Invertebrate Taxonomy*, 9, 1–81.
- Boer, A.J. de (1995b) The phylogeny and taxonomic status of the Chlorocystini (Homoptera, Tibicinidae). *Bijdragen tot de Dierkunde*, 65, 201–231.
- Boer, A.J. de (1995c) The taxonomy and biogeography of the cicada genus *Papuapsaltria* gen. n. (Homoptera, Tibicinidae). *Tijdschrift voor Entomologie*, 138, 1–44.
- Boer, A.J. de (1995d) Islands and cicadas adrift in the west-Pacific. Biogeographic patterns related to plate tectonics. *Tijdschrift voor Entomologie*, 138, 169–244.
- Boer, A.J. de (1996) *Mirabilopsaltria*, a new cicada genus from New Guinea, its taxonomy and biogeography (Homoptera Tibicinidae). *Tropical Zoology*, 9, 349–379.
- Boer, A.J. de (1997) Phylogeny and biogeography of Australian genera of Chlorocystini (Insecta: Homoptera: Tibicinidae). *Memoirs of the Museum of Victoria*, 56, 91–123.
- Boer, A.J. de and Duffels, J.P. (1996a) Historical biogeography of the cicadas of Wallacea, New Guinea and the West Pacific: a geotectonic explanation. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 124, 153–177.
- Boer, A.J. de and Duffels, J.P. (1996b) Biogeography of Indo-Pacific cicadas east of Wallace's Line. In: Keast, A. and Miller, S.E. (eds), *The origin and evolution of Pacific Island biotas, New Guinea to Eastern Polynesia: patterns and process*. SPB Academic Publishing, Amsterdam, pp. 297–330.
- Boisduval, J.B.A.D. de (1835) *Voyage de découvertes de l'Astrolabe exécuté par ordre du Roi, pendant les années 1826-1827-1828-1829, sous le commandement de M. J. Dumont D'Urville*. Faune entomologique de l'Océan Pacifique, avec l'illustration des Insectes nouveaux recueillis pendant le voyage. Vol. 2, Coléoptères et autres Ordres. J. Tastu, Paris. Pp. i–vii, 1–716, Atlas in folio (published separately), pls 1–12. [Reprinted 1835 (but lacking the plates) as *Faune de entomologique [sic] l'Océan, comprenant les Coléoptères, les Hémiptères, les Néuroptères, les Hyménoptères et les Diptères*. Roret, Paris. Pp. 1–705.]
- Boulard, M. (1965) L'appareil génital ectodermique des Cigales femelles. *Annales de la Société entomologique de France*, (n.s.)1, 797–812.
- Boulard, M. (1973) Classification raisonnée des Platypeteurs africaines (Homoptera–Cicadidae). *Bulletin du Muséum National d'Histoire Naturelle, Paris*, (3)90(2), 1161–1188.

- Boulard, M. (1974) *Spoerryana llewelyni* n.g. n.sp., une remarquable cigale d'Afrique Orientale (Hom. Cicadoidea). *Annales de la Société Entomologique de France*, (n.s.)10, 729–744.
- Boulard, M. (1975) Les Plautillidae, famille nouvelle d'Homoptères Cicadoidea. *Annali del Museo Civico di Storia Naturale di Genova*, 80, 313–318.
- Boulard, M. (1979a) Révision de la faune cicadéenne des Iles Maurice et Rodriguez. *Bulletin du Muséum National d'Histoire Naturelle, Paris*, 84, 27–47.
- Boulard, M. (1979b) Cigales nouvelles des Iles Salomon et des Iles Sous-le-vent. Notes biogéographiques (Hom. Cicadoidea). *Revue Française d'Entomologie*, (n.s.)1, 49–60.
- Boulard, M. (1980) Cigales nouvelles ou mal connues d'Afrique du Nord (Homoptera Cicadoidea). *Nouvelle Revue d'Entomologie*, 10, 313–324.
- Boulard, M. (1988) Taxonomie et nomenclature supérieures des Cicadoidea. Histoire problèmes et solutions. *Ecole pratique des hautes Etudes, Travaux du Laboratoire Biologie et Evolution des Insectes Hémipteroidea*, 1, 1–89. [An earlier version, issued in 1987, was for private circulation only and as such does not constitute formal publication.]
- Boulard, M. (1989) Expedition France-Australe (5 juillet–5 août 1988). Participation entomologique. Compte-Rendu de Mission en Australie Occidentale. *Ecole pratique des hautes Etudes, travaux du Laboratoire Biologie et Evolution des Insectes Hémipteroidea*, 2, 55–82. Separate numbered 1–33. [Reproduced in part in English with minor amendments, 1990.]
- Boulard, M. (1990) A new genus and species of cicada (Insecta, Homoptera, Tibicinidae) from Western Australia. In: P.F. Berry, S.D. Bradshaw and B.R. Wilson (eds), *Research in Shark Bay. Report on the France-Australe Bicentenary Expedition Committee*. Western Australian Museum, Perth, pp. 237–243. [An English translation of Boulard (1989).]
- Boulard, M. (1991) Cigales colligées lors des "Voyages de découvertes" conduits par J. Dumont d'Urville. Description de *Poecilopsaltria durvillei*, n. sp. (Hom. Cicadoidea, Cicadidae). *Bulletin de la Société entomologique de France*, 96, 117–124.
- Boulard, M. (1993) Quatre nouvelles espèces pour la faune cicadéenne de la Nouvelle-Calédonie (Homoptera, Cicadoidea, Tibicinidae). *Ecole pratique des hautes Etudes, travaux du Laboratoire Biologie et Evolution des Insectes Hémipteroidea*, 6, 109–126.
- Boulard, M. (1996) Sur deux nouvelles Cigales malgaches représentant deux genres nouveaux pour Madagascar (Cicadomorpha, Cicadidae, Cicadinae). *Ecole pratique des hautes Etudes, Biologie et Evolution des Insectes*, 9, 95–104.
- Boulard, M. (1997) Nouvelles cigales remarquables originaires de la Nouvelle-Calédonie (Homoptera, Cicadoidea, Tibicinidae). In: Najt, J. and Matile, L. (eds), *Zoologia Neocaledonica*, Volume 4. *Mémoires de la Muséum National d'Histoire Naturelle*, 171, 179–196.
- Boulard, M. (1998) Nomenclature et taxonomie supérieures des Cicadoidea ou vraies cigales: histoire, problèmes et solutions (Rhynchotha Homoptera Cicadomorpha). *Ecole pratique des hautes Etudes, Biologie et Evolution des Insectes*, 10, 79–129.
- Boulard, M. and Nel, A. (1990) Sur deux cigales fossiles des terrains tertiaires de la France [Homoptera, Cicadoidea]. *Revue Française d'Entomologie*, (n.s.)12(1), 37–45.
- Bredden, G. (1901) Die Hemipteren von Celebes. Ein Beitrag zur Faunistik der Insel. *Abhandlungen der Naturforschenden Gesellschaft zu Halle*, 24, 1–213, pl. I.
- Buckley, T.R., Arensburg, P., Simon, C. and Chambers, G.K. (2002) Combined data, Bayesian phylogenetics, and the origin of the New Zealand cicada genera. *Systematic Biology*, 51, 4–18.
- Buckley, T.R. and Simon, C. (2007) Evolutionary radiation of the cicada genus *Maoricicada* Dugdale (Hemiptera: Cicadoidea) and the origins of the New Zealand alpine biota. *Biological Journal of the Linnean Society*, 91, 419–435.
- Burmeister, H.C.C. (1835) Schnabelkerfe. Rhynchotha. *Handbuch der Entomologie*, 2(1), 1–396.
- Burns, A.N. (1957) Check list of Australian Cicadidae. *Entomologischen Arbeiten aus dem Museum Georg Frey*, 8(2), 609–678.
- Burns, A.N. (1958) The genus *Diemeniana* Distant with description of a new species (Hemiptera – Homoptera, Cicadidae, Tibicininae). *Proceedings of the Royal Society of Victoria*, (n.s.)70, 145–161, pl. XXV.
- Burns, A.N. (1959) Revision of the genus *Cyclochila* Amyot & Serville (Hemiptera–Homoptera, Cicadidae, Cicadinae). *Proceedings of the Royal Society of Victoria*, (n.s.)71, 39–44, pl. V.
- Burns, A.N. (1962a) Revision of the genus *Arunta* Distant Cicadidae, Cicadinae, division Thopharia Homoptera–Hemiptera. *Memoirs of the National Museum of Victoria*, 25, 259–268.
- Burns, A.N. (1962b) Revision of the genus *Thopha* Amyot and Serville Cicadidae, division Thopharia Homoptera–Hemiptera. *Memoirs of the National Museum of Victoria*, 25, 269–279.
- Burns, A.N. (1964) Revision of the genus *Macrotristria* Stal (Cicadidae–Homoptera–Hemiptera) with descriptions of new species. *Memoirs of the National Museum of Victoria*, 26, 77–123.
- Burwell, C.J. (1991) New distribution records of three Queensland cicadas (Homoptera: Cicadidae). *Australian Entomological Magazine*, 18, 124.
- Butler, A.G. (1874). Monographic list of the homopterous insects of the genus *Platypleura*. *Cistula Entomologica*, 1, 183–198.
- Chen, Kan-fan (1933) A list of Chinese known Cicadidae. *Entomology and Phytopathology*, 1 (Suppl.), 1–48.
- Chen, Kia-ziang (1943) New genera and species of Chinese cicadas with synonymical and nomenclatorial notes. *Journal of the New York Entomological Society*, 51, 19–52, pls I–II.

- China, W.E. (1964) Tibicenidae Van Duzee, 1916 (Insecta, Cicadoidea): proposed suppression under the plenary powers in favour of Platyleuridae Schmidt, 1918. Z.N.(S.) 1626. *Bulletin of Zoological Nomenclature*, 21(2), 154–160.
- Chou, I., Lei, Z., Li, L., Lu, X. and Yao, W. (1997) *The Cicadidae of China (Homoptera: Cicadoidea)*. Tianze Eldoneio, Hong Kong, 380 + 5 pp., 16 pls + 4 pls of Figs [In Chinese supplemented by English.]
- Claus, C.F.W. (1876) Unterordnung: Cicadaria (Homoptera), Cicaden, Zirpen. *Grundzüge der Zoologie*. Third edition. Zum Gebrauche an Universitäten und Höheren Lehranstalten sowie zum selbststudium, pp. 664–666.
- Claus, C.F.W. (1880) Unterordnung: Cicadaria (Homoptera), Cicaden, Zirpen. *Grundzüge der Zoologie*. Fourth edition. Zum wissenschaftlichen Gebrauche, 1, i–vii, 1–822.
- Claus, C.F.W. (1884) Sous-ordre Cicadaria, Homoptera. *Traité de zoologie*. Second French edition translated and revised by G. Moquin-Tandon, 1, i–xvi, 1–970.
- Claridge, M.F., Morgan, J.C. and Moulds, M.S. (1999) Substrate-transmitted acoustic signals of the primitive cicada, *Tettigarcta crinita* Distant (Hemiptera Cicadoidea, Tettigarctidae). *Journal of Natural History*, 33, 1831–1834.
- Coombs, M. (1993a) New distribution records for three cicadas (Hemiptera: Cicadidae) in south-western New South Wales. *Australian Entomologist*, 20, 133–134.
- Coombs, M. (1993b) Seasonality and reproductive behaviour of *Cicadetta tristigata* (Goding and Froggatt) (Hemiptera: Cicadidae) at Armidale, N.S.W. *Australian Entomologist*, 20, 143–144.
- Coombs, M. (1995) A new species of *Urabunana* Distant and new locality records for *U. marshalli* Distant (Hemiptera: Cicadidae) from northern New South Wales. *Journal of the Australian Entomological Society*, 34, 13–15.
- Coombs, M. (1996) Seasonality of cicadas (Hemiptera) on the Northern Tablelands of New South Wales. *Australian Entomologist*, 23, 55–60.
- Coombs, M. and Toolson, E. (1991) New distribution records for the double drummer cicada, *Thopha saccata* (Fabricius) (Homoptera: Cicadidae). *Australian Entomological Magazine*, 18, 100.
- Cooper, K.W. (1941) *Davisia bearcreekensis* Cooper, a new cicada from the Paleocene, with a brief review of the fossil Cicadidae. *American Journal of Science*, 239, 286–304; pl. 1.
- Cryan, J.R. (2005) Molecular phylogeny of Cicadomorpha (Insecta: Hemiptera: Cicadoidea, Cercopoidea and Membracoidea): adding evidence to the controversy. *Systematic Entomology* 30, 563–574.
- Daley, E. (2007) *Wings. An introduction to Tasmania's winged insects*. Riffles Pty Ltd, Buckland, Tasmania, xx, 236 pages.
- Dallas, W.S. (1857) *Homoptera. Elements of entomology: An outline of the natural history and classification of British insects*. Pp. 1–424. [Cicadas pp. 408–414.]
- Dallas, W.S. (1867) Insecta. *Zoological Record*, 3, 556, 557, 558–561, 565, 567, 569, 571–573.
- Davis, W.T. (1920) North American cicadas belonging to the genera *Platypedia* and *Melampsalta*. *Journal of the New York Entomological Society*, 28, 95–145, pl. 5.
- Delétang, L.F. (1923) Monografía de los Cicadidos (Cicadidae) argentinos y relacion de estos con la fauna sudamericana. *Anales del Museo Nacional de Historia Natural Buenos Aires*, 31, 538–649.
- Desmarest, E. (1859) Annelés-Hémiptères. *Encyclopédie d'Histoire Naturelle*, 6, 195–283, pls 13–18, 38, 40.
- Distant, W.L. (1881) Descriptions of new species belonging to the homopterous family Cicadidae. *Transactions of the Entomological Society of London*, 1881, 627–648.
- Distant, W.L. (1882) On some undescribed Cicadidae from Australia and the Pacific region. *Proceedings of the Zoological Society of London*, 1882(1), 125–134, pl. VII.
- Distant, W.L. (1883) Contributions to a proposed monograph of the homopterous family Cicadidae. Part 1. *Proceedings of the Zoological Society of London*, 1883, 187–194, pl. XXV.
- Distant, W.L. (1889) *A monograph of Oriental Cicadidae*. Parts 1 and 2. Indian Museum, Calcutta, pp. 1–48, pls i–iv.
- Distant, W.L. (1891) *A monograph of Oriental Cicadidae*. Parts 3 and 4. Indian Museum, Calcutta, pp. 49–96, pls v–ix.
- Distant, W.L. (1892) *A monograph of Oriental Cicadidae*. Parts 5–7. Indian Museum, Calcutta, pp. i–xiv, 97–158, pls x–xv.
- Distant, W.L. (1893) Descriptions of four new species of Cicadidae contained the Brussels Museum. *Annales de la Société entomologique de Belgique*, 37, 76–78. Separate paged 1–3.
- Distant, W.L. (1897) Cicadidae from the Malay Archipelago. *Annals and Magazine of Natural History*, (6)20, 369–371.
- Distant, W.L. (1901) Contributions to a knowledge of the Rhynchota. *Transactions of the Entomological Society of London*, 1901, 581–592, pl. 16.
- Distant, W.L. (1904a) Rhynchotal notes.–XXVI. *Annals and Magazine of Natural History*, (7)14, 293–303.
- Distant, W.L. (1904b) Rhynchotal notes.–XXVII. *Annals and Magazine of Natural History*, (7)14, 329–336.
- Distant, W.L. (1904c) Rhynchotal notes.–XXVIII. *Annals and Magazine of Natural History*, (7)14, 425–430.
- Distant, W.L. (1904d) Additions to a knowledge of the family Cicadidae. *Transactions of the Royal Entomological Society of London*, 1904: 667–676, pls 29–30.
- Distant, W.L. (1905a) Rhynchotal notes.–XXIX. *Annals and Magazine of Natural History*, (7)15, 58–70.
- Distant, W.L. (1905b) Rhynchotal notes.–XXX. *Annals and Magazine of Natural History*, (7)15, 304–319.
- Distant, W.L. (1905c) Rhynchotal notes.–XXXI. *Annals and Magazine of Natural History*, (7)15, 379–387.
- Distant, W.L. (1905d) Rhynchotal notes.–XXXII. *Annals and Magazine of Natural History*, (7)15, 478–486.
- Distant, W.L. (1905e) Rhynchotal notes.–XXXIII. *Annals and Magazine of Natural History*, (7)16, 22–35.
- Distant, W.L. (1905f) Rhynchotal notes.–XXXIV. *Annals and Magazine of Natural History*, (7)16, 203–216.



- Distant, W.L. (1905g) Rhynchotal notes.—XXXV. *Annals and Magazine of Natural History*, (7)16, 265–280.
- Distant, W.L. (1905h) Rhynchotal notes.—XXXVI. *Annals and Magazine of Natural History*, (7)16, 553–576.
- Distant, W.L. (1905i) Rhynchotal notes.—XXXVII. *Annals and Magazine of Natural History*, (7)16, 668–673.
- Distant, W.L. (1906a) Some undescribed species of Cicadidae. *Annals and Magazine of Natural History*, (7)17, 384–389.
- Distant, W.L. (1906b) Descriptions of a new species of Australian Cicadidae. *Entomologist*, 39, 148.
- Distant, W.L. (1906c) Rhynchota. Heteroptera–Homoptera. *The fauna of British India, including Ceylon and Burma*. Published under the authority of the Secretary of State for India in Council, 3, i–xiv, 1–503.
- Distant, W.L. (1906d) *A synonymic catalogue of Homoptera. Part 1. Cicadidae*. British Museum, London, 207 pp.
- Distant, W.L. (1906e) Undescribed Cicadidae. *Annales de la Société Entomologique de Belgique*, 50, 148–154.
- Distant, W.L. (1906f) Order Rhynchota. Suborder Homoptera. Family Cicadidae. *Insecta Transvaaliensia: a contribution to a knowledge of the entomology of South Africa*, 7, 167–180, pls 16–17.
- Distant, W.L. (1907) Rhynchotal notes.—XLIII. *Annals and Magazine of Natural History*, (7)20, 411–423.
- Distant, W.L. (1909) New Malayan Rhynchota. *Transactions of the Royal Entomological Society of London*, 1909, 385–396, pl. 10.
- Distant, W.L. (1910) Australian Cicadidae with remarks on some recent disputation. *Annales de la Société Entomologique de Belgique*, 54, 415–420.
- Distant, W.L. (1911) New genera and species of Cicadidae. *Annals and Magazine of Natural History*, (8)8, 132–137.
- Distant, W.L. (1912a) Homoptera. Fam. Cicadidae. Subfam. Cicadidae. *Genera Insectorum*, 142, 1–64, pls 1–7.
- Distant, W.L. (1912b) Descriptions of new genera and species of Oriental Homoptera. *Annals and Magazine of Natural History*, (8)9, 181–194.
- Distant, W.L. (1912c) Descriptions of some new Homoptera. *Annals and Magazine of Natural History*, (8)10, 438–446.
- Distant, W.L. (1913a) Undescribed species of Cicadidae. *Annals and Magazine of Natural History*, (8)12, 485–491.
- Distant, W.L. (1913b) Synonymical notes on some recently described Australian Cicadidae. *Proceedings of the Linnean Society of New South Wales*, 37(4), 600–601.
- Distant, W.L. (1914a) Homoptera, Fam. Cicadidae, Subfam. Gaeaninae. *Genera Insectorum*, 158, 1–38, pls 1–3.
- Distant, W.L. (1914b) Report on the Rhynchota collected by the Wollaston Expedition in Dutch New Guinea. *Transactions of the Zoological Society of London*, 20(11), 335–362, pl. XXXIV.
- Distant, W.L. (1914c) Some undescribed Cicadidae. *Annals and Magazine of Natural History*, (8)14, 61–65.
- Distant, W.L. (1914d) *Rhynchota from New Caledonia and the surrounding islands*. F. Sarasin & J. Roux, Nova Caledonia, (Zoologie)1(4), 369–390; pls 11–12.
- Distant, W.L. (1915) On some Australian Cicadidae. *Annals and Magazine of Natural History*, (8)16, 50–53.
- Distant, W.L. (1920) Some undescribed Ethiopian Cicadidae. *Annals and Magazine of Natural History*, (9)5, 369–376.
- Diabola, J. (1963) *Pinheya* n.g. of Melampsaltini, discussion on near genera and faunistic notes on Rhodesian Cicadoidea (Homoptera Auchenorrhyncha). *Publicacoes culturais da Companhia de Diamantes de Angola*, 66, 45–53.
- Dohrn, F.A. (1859) *Catalogus Hemipterorum*. Entomologischen Verein zu Stettin, Stettin, pp. 1–112.
- Donovan, E. (1805) *An epitome of the natural history of the insects of New Holland, New Zealand, New Guinea, Otaheite, and other islands in the Indian, Southern, and Pacific Oceans: including figures and descriptions of one hundred and fifty-three species of the more splendid, beautiful, and interesting insects, hitherto discovered in those countries, and which for the most part have not appeared in the works of any preceding author*. Privately published, London. Pp. i–iv, 41 hand-coloured plates (unnumbered) with corresponding text (unnumbered), index 2 pages (unnumbered).
- Douglas, J.W. (1879) Note on the synonymy of *Cicada montana* Scop. *Entomologist's Monthly Magazine*, 15, 209–210.
- Duffels, J.P. (1965) A new species of *Cosmopsaltria* Stål, with preliminary notes on the genus (Homoptera, Cicadidae). *Nova Guinea*, (Zool.)35, 371–376.
- Duffels, J.P. (1968) On the identity of *Orientopsaltria montivaga* (Distant, 1889) and *Orientopsaltria agatha* (Moulton, 1911) comb. n. (Homoptera–Cicadidae). *Beaufortia*, 15(190), 79–84.
- Duffels, J.P. (1970) The synonymy of *Diceropyga opercularis* (Walker) and *D. insularis* (Walker) with a description of *D. bredidini* n.sp. (Homoptera, Cicadidae). *Entomologische Berichten*, 30, 9–16.
- Duffels, J.P. (1977) A revision of the genus *Diceropyga* Stål 1870 (Homoptera, Cicadidae). *Monografieën van de Nederlandse Entomologische Vereeniging*, 8, 1–227.
- Duffels, J.P. (1979) Taxonomy and evolution of Cicadidae in the Papuan region. (Abstracts of Auchenorrhyncha Workshop, 23–25th August, 1978, Wageningen, The Netherlands). *Auchenorrhyncha Newsletter*, 1, 19–20.
- Duffels, J.P. (1982) *Brachylobopyga decorata* n. gen., n. sp. from Sulawesi, a new taxon of the subtribe Cosmopsaltriaria (Homoptera, Cicadoidea: Cicadidae). *Entomologische Berichten*, 42, 156–160.
- Duffels, J.P. (1983a) Taxonomy, phylogeny and biogeography of the genus *Cosmopsaltria*, with remarks on the historic biogeography of the subtribe Cosmopsaltriaria (Homoptera: Cicadidae). *Pacific Insects Monograph*, 39, 1–127.
- Duffels, J.P. (1983b) Distribution patterns of Oriental Cicadoidea (Homoptera) east of Wallace's Line and plate tectonics. In: Thornton, I.W.B. (ed.), Symposium on distribution and evolution of Pacific insects. *Geojournal*, 7(6), 479–564.
- Duffels, J.P. (1985) *Rhadinopyga* n. gen. from the "Vogelkop" of New Guinea and adjacent islands, a new genus of the subtribe Cosmopsaltriaria (Homoptera, Cicadoidea: Cicadidae). *Bijdragen tot de Dierkunde*, 55(2), 275–279.
- Duffels, J.P. (1986) Biogeography of Indo-Pacific Cicadoidea: a tentative recognition of areas of endemism. *Cladistics*, 2(4),

- Duffels, J.P. (1988a) The cicadas of the Fiji, Samoa and Tonga Islands, their taxonomy and biogeography (Homoptera, Cicadoidea). *Entomograph*, 10, 1–108.
- Duffels, J.P. (1988b) Biogeography of the cicadas of the island of Bacan, Maluku, Indonesia, with description of *Diceropyga bacanensis* n. sp. (Homoptera, Cicadidae). *Tijdschrift voor Entomologie*, 131, 7–12.
- Duffels, J.P. (1990) Biogeography of Sulawesi cicadas (Homoptera: Cicadoidea). In: Knight, W.J. and Holloway, J.D. (eds), *Insects and the rain forests of South East Asia (Wallacea)*. Royal Entomological Society, London, pp. 63–72.
- Duffels, J.P. (1993) The systematic position of *Moana expansa* (Homoptera: Cicadidae), with reference to sound organs and the higher classification of the superfamily Cicadoidea. *Journal of Natural History*, 27, 1223–1237.
- Duffels, J.P. (1997) *Inflatopyga*, a new cicada genus (Homoptera: Cicadoidea: Cicadidae) endemic to the Solomon Islands. *Invertebrate Taxonomy*, 11(4), 549–568.
- Duffels, J.P. (2011) New genera and species of the tribe Taphurini (Hemiptera, Cicadidae) from Sundaland. *Deutsche Entomologische Zeitschrift*, 58: 77–104.
- Duffels, J.P. and Boer, A.J. de (1990) Areas of endemism and composite areas in East Malesia. In: Baas, P. et al. (eds), *The plant diversity of Malesia*. Kluwer Academic Publishers, Netherlands, pp. 249–272.
- Duffels, J.P. and van der Laan, P. A. (1985) *Catalogue of the Cicadoidea (Homoptera, Auchenorrhyncha) 1956–1980*. Junk, Dordrecht, Netherlands, Series Entomologica, Vol. 34, 414 pp.
- Dugdale, J.S. [1972]. Genera of New Zealand Cicadidae [Homoptera]. *New Zealand Journal of Science*, 14(4), 856–882.
- Dugdale, J.S. and Fleming, C.A. (1969) Two New Zealand cicadas collected on Cook's Endeavour voyage, with descriptions of new species. *New Zealand Journal of Science*, 12(4), 929–957.
- Dunn, K. (1991) New distribution records for some eastern Australian cicadas. *Victorian Entomologist*, 21, 52–53.
- Dunn, K. (1992) Notes on the silver cicada *Cicadetta celis* Moulds. *Victorian Entomologist*, 22, 12–17.
- Dunn, K. (1998) Butterfly watching in Tasmania - Part II. *Victorian Entomologist*, 28, 44–49.
- Dworakowska, I. (1988) Main veins of the wings of Auchenorrhyncha (Insecta, Rhynchota: Hemelytrata). *Entomologische Abhandlungen und Berichte aus dem Staatlichen Museum für Tierkunde in Dresden*, 52(3), 63–108.
- Emery, D.L. and Emery, S.J. (2002) First records for the paperbark cicada *Cicadetta hackeri* (Distant) and *Cicadetta spinosa* (Goding & Froggatt) (Hemiptera: Cicadidae) from Sydney, New South Wales. *Australian Entomologist*, 29, 137–139.
- Emery, D.L., Emery, S.J., Emery, N.J. and Popple, L.W. (2005) A phenological study of the cicadas (Hemiptera: Cicadidae) in western Sydney, New South Wales, with notes on plant associations. *Australian Entomologist*, 32, 97–110.
- Erichson, W.F. (1842) Beitrag zur Insecten-Fauna von Vandiemensland, mit besonderer Berücksichtigung der geographischen verbreitung der Insecten, von Herausgeber. *Archiv für Naturgeschichte*, 8(2), 83–291, pls 4, 5.
- Esaki, T. (1947) Hemiptera Micronesia, II. Cicadidae. *Mushi*, 17, 29–38, pl. 1.
- Esaki, T. and Miyamoto, S. (1975) Insects of Micronesia. Homoptera: Cicadidae. *Insects Micronesia*, 6(9), 633–656.
- Evans, J.W. (1941) The morphology of *Tettigarcta tomentosa* White, (Homoptera, Cicadidae). *Papers and Proceedings of the Royal Society of Tasmania*, 1940, 35–49.
- Evans, J.W. (1946) A natural classification of leaf-hoppers (Homoptera, Jassoidea). Part 2: Aetalionidae, Hylicidae, Eurymeliidae. *Transactions of the Royal Entomological Society of London*, 97(2), 39–54.
- Evans, J.W. (1948) Some observations on the classification of the Membracidae and on the ancestry, phylogeny and distribution of the Jassoidea. *Transactions of the Royal Entomological Society of London*, 99(15), 497–515.
- Evans, J.W. (1956a) Palaeozoic and Mesozoic Hemiptera (Insecta). *Australian Journal of Zoology*, 4(2), 165–258.
- Evans, J.W. (1956b) Australian insects. *Australian Museum Magazine*, 12(4), 129–132.
- Evans, J.W. (1957) Some aspects of the morphology and interrelationships of extinct and recent Homoptera. *Transactions of the Royal Entomological Society of London*, 109(9), 275–294.
- Evans, J.W. (1958a) Insect distribution and continental drift. In: Carey, W. (ed.), Continental drift, a symposium, being a symposium on the present status of the continental drift hypothesis, held in the Geology Department of the University of Tasmania, in March, 1956. *University of Tasmania Geology Department Symposia*, 2, 134–161.
- Evans, J.W. (1958b) Some aspects of the morphology, biology, evolution and distribution of Homoptera. *Circular of the Society of Entomologists, Sydney*, 66, 43–48.
- Evans, J.W. (1959) The zoogeography of some Australian insects. In: Keast, A. et al. (eds), *Biogeography and ecology in Australia*. Junk, The Hague, pp. 150–163.
- Evans, J.W. (1963) The phylogeny of the Homoptera. *Annual Review of Entomology*, 8, 77–94.
- Evans, J.W. (1964) The periods of origin and diversification of the superfamilies of the Homoptera–Auchenorrhyncha (Insecta) as determined by a study of the wings of Palaeozoic and Mesozoic fossils. *Proceedings of the Linnean Society of London*, 175, 171–181.
- Evans, J.W. (1988) Some aspects of the biology, morphology, and evolution of leafhoppers (Homoptera: Cicadelloidea and Membracoidea). *Great Basin Naturalist Memoirs*, 12, 61–66.
- Evans, J.W. (1989) *Insect delight. A life's journey*. xii, 212 pp. Brolga Press, Canberra.
- Ewart, A. (1986) Cicadas of Kroombit Tops. *Queensland Naturalist*, 27, 50–57.
- Ewart, A. (1988) Cicadas (Homoptera). In: Scott, G. (ed.), *Lake Broadwater. The natural history of an inland lake and its environs*. Darling Downs Institute Press, Toowoomba, pp. 180–201.



- Ewart, A. (1989a) Cicada songs – song production, structures, variation and uniqueness within species. *News Bulletin of the Entomological Society of Queensland*, 17(7), 75–82.
- Ewart, A. (1989b) Revisionary notes on the genus *Pauropsalta* Goding and Froggatt (Homoptera: Cicadidae) with special reference to Queensland. *Memoirs of the Queensland Museum*, 27(2), 289–375.
- Ewart, A. (1993) Cicadas of the Heathlands region, Cape York Peninsula. In: Cape York Peninsula Scientific Expedition, Wet Season 1992 Report. *Royal Geographical Society of Queensland, Geography Monograph Series*, 3, 135–147.
- Ewart, A. (1995) Cicadas. In: M. Ryan (ed.), *Wildlife of greater Brisbane*. Queensland Museum, Brisbane, pp. 79–88.
- Ewart, A. (1998a) Cicadas, and their songs, of the Miles–Chinchilla region. *Queensland Naturalist*, 36, 54–72.
- Ewart, A. (1998b) Cicadas of Musselbrook Reserve. In: Musselbrook Reserve Scientific Study Report. *Royal Geographical Society of Queensland, Geography Monograph Series*, 4, 135–138.
- Ewart, A. (2001a) Emergence patterns and densities of cicadas (Hemiptera: Cicadidae) near Caloundra, south-east Queensland. *Australian Entomologist*, 28, 69–84.
- Ewart, A. (2001b) Dusk chorusing behaviour in cicadas (Homoptera: Cicadidae) and a mole cricket, Brisbane, Queensland. *Memoirs of the Queensland Museum*, 46, 499–510.
- Ewart, A. (2005a) New genera and species of small ticking and 'chirping' cicadas (Hemiptera: Cicadoidea: Cicadidae) from Queensland, with descriptions of their songs. *Memoirs of the Queensland Museum*, 51, 439–500.
- Ewart, A. (2005b) Cicadas of the Pennyfather River – Weipa areas, October/November 2002, with comparative notes on the cicadas from Heathlands, Cape York Peninsula. In: Gulf of Carpentaria Scientific Study Report. *Royal Geographical Society of Queensland, Geography Monograph Series*, 10, 169–179.
- Ewart, A. (2009a) Cicadas of the eastern segment of the Cravens Peak Reserve, northeastern Simpson Desert, S.W. Queensland; January/February 2007. In: Cravens Peak Scientific Study Report. *Royal Geographical Society of Queensland, Geography Monograph Series*, 13, 117–150.
- Ewart, A. (2009b) *Crotopsalta leptotigris*, a new species of ticking cicada (Hemiptera: Cicadoidea: Cicadidae) from Cravens Peak, southwest Queensland. *Australian Entomologist*, 36, 139–151.
- Ewart, A. and Marques, D. (2008) A new genus of grass cicadas (Hemiptera: Cicadoidea: Cicadidae) from Queensland, with descriptions of their songs. *Memoirs of the Queensland Museum*, 52, 149–202.
- Ewart, A. and Popple, L.W. (2001) Cicadas, and their songs, from south-western Queensland. *Queensland Naturalist*, 39, 52–71.
- Ewart, A. and Popple, L.W. (2007) Songs and calling behaviour of *Froggattoides typicus* Distant (Hemiptera: Cicadoidea: Cicadidae), a nocturnally singing cicada. *Australian Entomologist*, 34, 127–139.
- Fabricius, J. C. (1775) *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Korte, Flensburg & Leipzig, pp. 1–832.
- Fabricius, J.C. (1803) *Systema Rhyngotorum secundum ordines, genera, species, adiectis synonymis, locis, observationibus, descriptionibus*. Akademische Druck- u. Verlagsanstalt, Graz, Austria, pp. i–x, 1–314, index 1–21. [Cicadas viii, 33–44. Second edition, 1822. Facsimilie reprint, 1971.]
- Faithfull, I. (2010) Further records of vertebrate predation on cicadas (Hemiptera: Cicadidae). *Victorian Entomologist*, 40, 65–71.
- Fleming, C.A. (1973) The Kermadec Islands cicada and its relatives (Hemiptera: Homoptera). *New Zealand Journal of Science*, 16, 315–322, pl. 1.
- Fleming, C.A. (1975a) Acoustic behaviour as a generic character in New Zealand cicadas (Hemiptera: Homoptera). *Journal of the Royal Society of New Zealand*, 5(1), 47–64, figs 1–9.
- Fleming, C.A. (1975b) Adaptive radiation in New Zealand cicadas. *Proceedings of the American Philosophical Society*, 119(4), 298–306.
- Fleming, C.A. (1975c) Cicadas (2). In: Knox, R. (ed.), *New Zealand's natural heritage*. Volume 4. Part 57. Paul Hamlyn, Wellington, pp. 1591–1595.
- Fleming, C.A. (1984) The cicada genus *Kikihia* Dugdale (Hemiptera, Homoptera). Part 1. The New Zealand green foliage cicadas. *Records of the National Museum of New Zealand*, 2(18), 191–206.
- Froggatt, W.W. (1907) *Australian insects*. William Brooks, Sydney, 449 pp., 37 pls.
- Germar, E.F. (1830) Species Cicadarium enumeratae et sub genera distributae. *Thon's Entomologisches Archiv*, 2(2), 37–57, pl. 1.
- Germar, E.F. (1834) Observations sur plusieurs espèces du genre *Cicada*, Latr. *Revue d'Entomologique Silberman*, 2, 49–82, pls 19–26.
- Gerstaecker, C.E.A. (1863) Hemiptera–Homoptera. Peers, W.C.H., Carus, C.G. and Gerstaecker, C.E.A. *Handbuch der Zoologie*, 2, 1–642 [Cicadas pp. 285–303].
- Goding, F.W. and Froggatt, W.W. (1904) Monograph of the Australian Cicadidae. *Proceedings of the Linnean Society of New South Wales*, 29(3), 561–670, pls XVIII, XIX.
- Gomez-Menor, O.J. (1951) Homópteros que atacan a los frutales. *Trabajos de la Estación de Fitopatología Agronomica de Madris*, 228, 1–38.
- Gomez-Menor, O.J. (1957) Monografía de cicadidos (Homoptera) de Espana. *Memorias de la Real Academia de Ciencias Exactas, Fisicas y Naturales de Madrid*, 19, 1–87.

- Grimaldi, D. and Engel, M.S. (2005). *Evolution of the insects*. Cambridge University Press, New York. Pp. i–xv, 1–755.
- Guérin-Ménéville, F.E. (1830–1832, 1838) Insectes. In: L.I. Duperrey, *Voyage autour du monde, exécuté par ordre du Roi, sur la corvette de sa Majesté, La Coquille, pendant les années 1822, 1823, 1824 et 1825, sous le ministère et conformément aux instructions de S.E.M. le Marquis de Clermont-Tonnerre, Ministre de la Marine; et publié sous les auspices de son Excellence Mgr le Cte de Chabrol, Ministre de la Marine et des Colonies*. A. Bertrand, Paris. Text; Zoologie 2(2), Division 1, pp. 57–302. Zoologie Atlas; Insects, pls 1–21. [The title page of the plates is dated 1826 but these were published in livraisons and the plates of insects appeared during 1830 and 1832 (and not in chronological order). Plate 10, the only plate illustrating cicadas, was published approximately 22 December, 1831. The text of the insects did not appear until 1838, sometime between 15th November and 31st December.]
- Guérin-Ménéville, F.E. (1844) Insectes. Iconographie du Règne Animal de G. Cuvier, ou représentation d'après nature de l'une des espèces les plus remarquables, et souvent non encore figurées, de chaque genre d'animaux. Avec un texte descriptif mis au courant de la science. Ouvrage pouvant servir d'atlas a tous les traités de zoologie 1829–1838. 1844, 1–576 [Cicadas pp. 355–370].
- Gwynne, D.T. (1987). Sex-biased predation and the risky mate-locating behaviour of male tick-tock cicadas (Homoptera: Cicadidae). *Animal Behaviour*, 35, 571–576.
- Gwynne, D.T., Yeoh, P. and Schatral, A. (1988) The singing insects of King's Park and Perth gardens. *Western Australian Naturalist*, 17, 25–71.
- Handlirsch, A. (1925) Ordnung: Homoptera (Latr.) Westw. (Homopteren) in Systematische Übersicht (Schluss.). *Schröder's Handbuch der Entomologie*, 3(17–18), 1102–1126.
- Hansen, H.J. (1890) Gamle og nye hovedmomenter til Cicadariernes morfologi og systematik. *Entomologisk Tidsskrift utgivet af Entomologiska Föreningen i Stockholm*, 11, 19–76, pls 1–2. [For English translations see Hansen 1902, 1903.]
- Hansen, H.J., (1902) On the morphology and classification of the auchenorrhynchous Homoptera. *Entomologist*, 35, 214–217. [Partial translation of Hansen, 1890.]
- Hansen, H.J. (1903) On the morphology and classification of the auchenorrhynchous Homoptera. [Continued.] *Entomologist*, 36, 42–44. [Partial translation of Hansen, 1890.]
- Hardy, G.H. (1918) Tasmanian Cicadidae. *Papers and Proceedings of the Royal Society of Tasmania*, 1917, 69–71.
- Haupt, H. (1929) Neueinteilung der Homoptera–Cicadina nach phylogenetisch zu wertenden Merkmalen. *Zoologische Jahrbücher. Abteilung für Systematik, Ökologie und Biologie der Tiere, Jena*, 58, 173–286.
- Haupt, H. (1935) Unterordnung: Gleichflügler, Homoptera. *Die Tierwelt Mitteleuropas. Ein Handbuch zu ihrer Bestimmung als Grundlage für faunistisch-zoogeographische Arbeiten*. Unter Mitwirkung hervor-ragender Fachleute herausgegeben von P. Brohmer, P. Ehrmann und G. Ulmer 4(3), 115–221.
- Hawkeswood, T.J. (2007) Notes on the occurrence and habitat of a population of *Thopha saccata* (Fabricius, 1803) (Homoptera: Cicadidae) on the central coast of New South Wales, Australia. *Calodema Supplementary Paper*, 20, 1–2.
- Hayashi, M. (1974) The cicadas of the genus *Platypleura* (Homoptera, Cicadidae) in the Ryukyu Archipelago, with the description of a new species. *Kontyû, Tokyo*, 42(3), 232–253.
- Hayashi, M. (1975) On the species of the genus *Meimuna* Distant (Homoptera, Cicadidae) of the Ryukyus. 1. Synonymy and description of the species. *Kontyû, Tokyo*, 43(3), 281–298.
- Haywood, B.T. (2006a) A study of the cicadas (Hemiptera: Homoptera) in the south east of South Australia – Part I. *South Australian Naturalist*, 80, 12–23.
- Haywood, B.T. (2006b) A study of the cicadas (Hemiptera: Homoptera) in the south east of South Australia – Part II. *South Australian Naturalist*, 80, 48–53.
- Heslop-Harrison, G. (1952) Preliminary notes on the ancestry, family relations, evolution and speciation of the Homopterous Psyllidae.–II. *Annals and Magazine of Natural History*, (12)5, 679–696.
- Heslop-Harrison, G. (1957) The age and origin of the Hemiptera with special reference to the suborder Homoptera. Part II. The assessment, integration and use of the evidence from fossil and modern Homoptera in phylogenetic deduction. *Proceedings of the University of Durham Philosophical Society*, 13(6), 41–53.
- Heslop-Harrison, G. (1960) Sound production in the Homoptera with special reference to sound producing mechanisms in the Psyllidae. *Annals and Magazine of Natural History*, (13)3, 633–640.
- Hesse, A.J. (1925) Contributions to a knowledge of the fauna of South-West Africa. IV. A list of the heteropterous and homopterous Hemiptera of South-West Africa. *Annals of the South African Museum* 23, 1–190, pls 1–8. [Cicadas pp. 138–176, pls 6–8.]
- Holloway, J.D. (1979) *A survey of the Lepidoptera, biogeography and ecology of New Caledonia*. Series Entomologica 15. Pp. i–xii, 1–588. W. Junk, The Hague. [Cicadas pp. 234–236.]
- Horváth, G. de (1900) Hemiptera. In R. Semon, *Zoologische Forschungsreisen in Australien und dem Malayischen Archipel. Denkschriften der Medizinisch-naturwissenschaftlichen Gesellschaft zu Jena*, 8(17), 629–642.
- Horváth, G. de (1911) Hemiptera nova vel minus cognita e regione palaeartica. II. *Magyar Nemzeti Museum Annales Historico-Naturales Budapest*, 9, 573–610.
- Horváth, G. de (1912a) Miscellanea Hemipterologica. X. Cicadidarum genera palaeartica. *Magyar Nemzeti Museum Annales Historico-Naturales Budapest*, 10, 602–606.
- Horváth, G. de (1912b) Miscellanea Hemipterologica. XII. Adnotationes synonymicae et systematicae. *Magyar Nemzeti*

- Museum Annales Historico-Naturales Budapest*, 10, 607–609.
- Horváth, G. de (1913) Étude morphologique sur la construction de l'élytre des Cicadides. *Transactions of the International Congress of Entomology*, 2, 422–432.
- Horváth, G. (1926) Les noms génériques de nos trois grandes Cigales indigènes. *Magyar Nemzeti Museum Annales Historico-Naturales Budapest*, 23, 93–98.
- Hudson, G.V. (1891) On the New Zealand Cicadae. *Transactions of the New Zealand Institute*, 23, 49–55, pl. 9.
- Hudson, G.V. (1927) Notes on variation in neural structures of New Zealand cicadas. (Genus *Melampsalta*). *Transactions and Proceedings of the New Zealand Institute*, 58, 73–74.
- Hudson, G.V. (1950) *Fragments of New Zealand entomology. A popular account of all the New Zealand cicadas. The natural history of the New Zealand glow-worm. A second supplement to The Butterflies and Moths of New Zealand and notes on many other native insects.* Ferguson and Osborn, Wellington. Pp. 1–188, pls A–B, 1–17.
- Imhof, O.E. (1905) Zur Kenntnis des Baues der Insektenflügel insbesondere bei Cicadiden. *Zeitschrift für Wissenschaftliche Zoologie*, 83, 211–223.
- Imhof, O.E. (1929) Berichtigungen zur Kenntnis des Baues von Insektenflügeln. *Transactions of the International Congress of Entomology*, 4, 793–794.
- Imhof, O.E. (1933) Ailes des Cicadides. Type de la majorité. *Comptes Rendus des la Congrès International d'Entomologie*, 5, 303–308.
- Imhof, O.E. (1940) Pteronologica. *Transactions of the International Congress of Entomology* 6(1), 393–397.
- Imms, A.D. (1957) *A general textbook of entomology including the anatomy, physiology, development and classification of insects.* Methuen, London and Dutton, New York. x, 886 pp.
- Jacobi, A. (1903) Singcikaden von Ost-Neuguinea. *Sitzungsberichte der Gesellschaft der naturforschende Freunde zu Berlin*, 1903, 10–15.
- Jacobi, A. (1905) Zur Kenntnis der Cicadenfauna von Tonking. *Zoologische Jahrbücher. Abteilung für Systematik, Geographie und Biologie der Tiere*, 21, 425–446, pl. 21.
- Jacobi, A. (1941) Die Zikadenfauna der Kleinen sundainseln. Nach. der Expeditionsausbeute von B. Rensch. *Zoologische Jahrbücher. Abteilung für Systematik, Geographie und Biologie der Tiere*, 74, 277–322, pl. 5.
- Josephson, R.K. and Young, D. (1981). Synchronous and asynchronous muscles in cicadas. *Journal of Experimental Biology*, 91, 219–237.
- Jong, M.R. de (1982) The Australian species of the genus *Lembeja* Distant, 1892 (Homoptera, Tibicinidae). *Bijdragen tot de Dierkunde*, 52(2), 175–185.
- Jong, M.R. de (1985) Taxonomy and biogeography of Oriental Prasiini I: the genus *Prasia* Stål, 1863 (Homoptera, Tibicinidae). *Tijdschrift voor Entomologie*, 128(2), 165–191.
- Jong, M.R. de (1986) Taxonomy and biogeography of Oriental Prasiini. 2. The *foliata* group of the genus *Lembeja* Distant, 1892 (Homoptera, Tibicinidae). *Tijdschrift voor Entomologie*, 129(5), 141–180.
- Jong, M.R. de (1987) Taxonomy and biogeography of Oriental Prasiini 3: the *fatiloqua* and *parvula* groups of the genus *Lembeja* Distant, 1892 (Homoptera, Tibicinidae). *Tijdschrift voor Entomologie*, 130, 177–209.
- Jong, M.R. de and Duffels, J.P. (1981) The identity, distribution and synonymy of *Lembeja papuensis* Distant, 1897 (Homoptera, Tibicinidae). *Bulletin zoologisch Museum Universiteit van Amsterdam*, 8(7), 53–62.
- Josephson, R.K. and Young, D. (1981) Synchronous and asynchronous muscles in cicadas. *Journal of Experimental Biology*, 91, 219–237.
- Karsch, F.A.F. (1890a) Beiträge zur Kenntniss der singcikaden Afrika's und Madagaskar's. *Berliner Entomologische Zeitschrift*, 35, 85–130, pls 3–4.
- Karsch, F.A.F. (1890b) Ueber die Singcicadengattung *Perissoneura* Distant. *Entomologische Nachrichten*, 17, 190–192.
- Kato, M. (1925a) Japanese Cicadidae, with descriptions of two new species, one new subspecies and aberrant form. *Transactions of the Formosa Natural History Society*, 15, 92–101.
- Kato, M. (1925b) Japanese Cicadidae, with descriptions of new species. *Transactions of the Formosa Natural History Society* 15, 1–47, 1 pl.
- Kato, M. (1925c) The Japanese Cicadidae, with descriptions of some new species and genera. *Transactions of the Formosa Natural History Society*, 15, 55–76, pls 1–2. [In Japanese.]
- Kato, M. (1926) [Observations on *Mogannia hebes*.] *Insect World*, 30, 146–152. [In Japanese.]
- Kato, M. (1927) A catalogue of Japanese Cicadidae, with descriptions of new genus, species and others. *Transactions of the Formosa Natural History Society*, 17, 19–41. [In Japanese.]
- Kato, M. (1930) [Distribution of Japanese Cicadidae.] *Insect World*, 34, 146–150. (In Japanese)
- Kato, M. (1931) Notes on the distribution of Cicadidae in Japanese Empire. *Bulletin of the Biogeographical Society of Japan*, 2, 36–76. [Separate paged 1–41.]
- Kato, M. (1932) *Monograph of Cicadidae*. San Sei Do, Tokyo. 450 pp., 32 pls. [In Japanese but partly supplemented by English.]
- Kato, M. (1933) Notes on the sound organs of Cicadidae and Orthoptera. *Entomological World*, 1, 348–357, pls 25–27.
- Kato, M. (1941) [On the Cicadidae from South Sea Islands]. *Kagaku Nanyo*, 4, 53–55.
- Kato, M. (1944) [Title in Japanese]. *Bulletin of the Cicadidae Museum*, 14, 1–8.



- Kato, M. (1954) [Cicadas of Japan, (3)]. [*Shin Konchu*, 7(11)], 40–47.
- Kato, M. (1956) *The biology of the cicadas*. [*Bulletin of the Cicadidae Museum*.] 319 pp., 46 pls. Iwasaki Shoten, Jinbocho Kanda, Tokyo. [In Japanese; headings, subheadings, captions and index in English. Facsimile reprint, 1981, Scientist Inc., Japan.]
- Kato, M. (1961) *Cicadidae (Insecta)*. [Fauna Japonica.] xiv, 72 pp, pls I–XXXIV. Biogeographical Society of Japan, Tokyo.
- Kirby, W.F. (1889) On the insects (exclusive of Coleoptera and Lepidoptera) of Christmas Island. *Proceedings of the Zoological Society of London*, 1888, 546–555.
- Kirby, W.F. (1896.) Notes on the Cicadidae of New Zealand. *Transactions and Proceedings of the New Zealand Institute*, 28, 454–459.
- Kirby, W.F. (1897) Sub-order Homoptera. (Frog-hoppers, plant-lice, etc.). *The concise knowledge natural history 1897*. xvi, 771 pp., 4 pls.
- Kirkaldy, G.W. (1900) Bibliographical and nomenclatorial notes on the Rhynchota. No. 1. *Entomologist*, 33, 238–243.
- Kirkaldy, G.W. (1903a) On the nomenclature of the genera of the Rhynchota; Heteroptera and auchenorrhynchous Homoptera. *Entomologist*, 36, 213–216.
- Kirkaldy, G.W. (1903b) On the nomenclature of the genera of the Rhynchota; Heteroptera and auchenorrhynchous Homoptera. *Entomologist*, 36, 230–233.
- Kirkaldy, G.W. (1904) Bibliographical and nomenclatorial notes on the Hemiptera.– No. 3. *Entomologist*, 37, 279–283.
- Kirkaldy, G.W. (1907a) Leaf-hoppers–supplement. (Hemiptera.). *Bulletin of the Hawaii Sugar Planters' Association, Division of Entomology*, 3, 1–186, pls 1–20.
- Kirkaldy, G.W. (1907b) Some annotations to M. Distant's recent Catalogue of the Cicadidae. (Hem.). *Annales de la Société Entomologique de Belgique*, 51, 303–309; [Separate paged 1–7.]
- Kirkaldy, G.W. (1909) Hemiptera, old and new, No. 2. *Canadian Entomologist*, 41(11), 388–392. [Not published 1910 as sometimes stated.]
- Kolenati, F. (1857) Meletamata Entomologica. *Bulletin de la Société Impériale des Naturalistes Moscou (Section Biologique)*, 30, 399–444, pls V–VI.
- Kramer, S. (1950) The morphology and phylogeny of auchenorrhynchous Homoptera (Insecta). *Illinois Biological Monographs*, 20(4), i–vii, 1–111.
- Kuhlgatz, T. (1905) Schädliche Wanzen und Cicaden der Baumwollstauden. *Mitteilungen aus dem Zoologischen Museum, Berlin*, 3, 31–115, pls 2–3.
- Lallemant, V. and Synave, H. (1953) Homoptères de Sumba et Flores. In *Wissenschaftliche Ergebnisse der Sumba–expedition des Museums für Völkerkunde und des Naturhistorischen Museums in Basel, 1949. Verhandlungen der Naturforschenden Gesellschaft in Basel*, 64, 229–254.
- Lameere, A. (1935) Hémiptères. *Précis de Zoologie*, 4, 383–458.
- Lane, D.H. (1993) Can flawed statistics be a substitute for real biology? *New Zealand Journal of Zoology*, 20, 51–59.
- Lane, D.H. (1995) The recognition concept of species applied in an analysis of putative hybridization in New Zealand cicadas of the genus *Kikihia* (Insecta: Hemiptera: Tibicinidae). In: Lambert, D.M. and Spencer, H.G. (eds), *Speciation and the recognition concept theory and application*. Pp. 367–421.
- Lawrence, J.F., Nielsen, E. S. and Mackerras, I. M. (1991) Skeletal anatomy and key to orders. Chapter 1 in Naumann, I. D. (ed.), *The insects of Australia*. Division of Entomology, CSIRO, Canberra and Melbourne University Press, Carlton. Pp. 3–32.
- Lea, A.M. (1926) The black cicada or red-eye (*Psaltoda moerens* Germ.). *South Australian Naturalist*, 7(2), 39–41.
- Leach, W.E. (1814) *The zoological miscellany; being descriptions of new, or interesting animals*. Vol. I. Nodder & Son, London. Pp. 1–144, pls 1–60. [Index (pp. 139–144), published 1815].
- Lee, Y.J. (2008) A checklist of Cicadidae (Insecta: Hemiptera) from Vietnam, with some taxonomic remarks. *Zootaxa*, 1787, 1–27.
- Lee, Y.J. and Hill, K.B.R. (2010) Systematic revision of the genus *Psithyrystria* Stål (Hemiptera: Cicadidae) with seven new species and a molecular phylogeny of the genus and higher taxa. *Systematic Entomology*, 35: 277–305.
- Leston, D. and Pringle, J.W.S. (1963) Acoustical behaviour of Hemiptera. In: R.-G. Busnel (Ed), *Acoustic behaviour of animals*. Elsevier Publishing Co., Amsterdam, pp. 391–411.
- Linden von, G.M. (1901) Die Flügelzeichnung der Insekten. *Biologisches Zentralblatt*, 21, 753–779. [Cicadas pp. 760–761.]
- Linnaeus, C. (1758) *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Vol. 1. Regnum Animale, 10th edition. Laurentii Salri, Stockholm (Holmiae). Pp. i–iv, 1–824.
- Lloyd, M. and Dybas, H.S. (1966) The periodical cicada problem. II. Evolution. *Evolution, Lancaster, Pa.*, 20(4), 466–505.
- Ludwig, H. (1886) Unterordnung. Homoptera. Gleichflüger, Zirpen. Dr. Johannes Leunis Synopsis der Thierkunde. Ein Handbuch für höhere Lehranstalten und für Alle welche sich wissenschaftlich mit der Naturgeschichte der Thiere beschäftigen wollen. Dritte, Auflage 2, i–xvi, 1–1231. [Cicadas pp. 462–467.]
- MacLachlan, R. (1891) The genus *Perissoneura*. *Entomologische Nachrichten, Berlin*, 17, 319–320.
- Marschall, A.F. (1873) Hemiptera. *Nomenclator Zoologicus continens nomina Systematica generum animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita*. Sub auspicio et sumptibus C.R. Societatis Zoologico-Botani-

cae. iv, 482 pp. [Cicadas pp. 351–385.]

- Marshall, D.C., Slon, K., Cooley, J.R., Hill, K.B.R. and Simon, C. (2008) Steady Plio-Pleistocene diversification and a 2-million-year sympatry threshold in a New Zealand cicada radiation. *Molecular Phylogenetics and Evolution*, 48, 1054–1066.
- Marshall, D.C., Hill, K.B.R., Fontaine, K.M., Buckley, T.R. and Simon, C. (2009) Glacial refugia in a maritime temperate climate: cicada (*Kikihia subalpina*) mtDNA phylogeography in New Zealand. *Molecular Ecology*, 18, 1995–2009.
- Marshall, D.C., Hill, K.B.R., Cooley, J.R. and Simon, C. (2011) Hybridization, mitochondrial DNA phylogeography, and prediction of early stages of reproductive isolation: lessons from New Zealand cicadas (genus *Kikihia*). *Systematic Biology*, 60: 482–502.
- Matsuda, R. (1970) Morphology and evolution of the insect thorax. *Memoirs of the Entomological Society of Canada*, 76, 1–431.
- Matsuda, R. (1976) *Morphology and evolution of the insect abdomen. With special reference to developmental patterns and their bearings upon systematics*. viii, 534 pp. Pergamon Press, Oxford.
- Matsumura, S. (1907) Die Cicadinen Japans. *Annotationes Zoologicae Japonenses*, 6, 83–116.
- Matsumura, S. (1917) A list of the Japanese and Formosan Cicadidae, with descriptions of new species and genera. *Transactions of the Sapporo Natural History Society*, 6, 186–212.
- McCoy, F. (1880) *Natural history of Victoria. Prodromus of the zoology of Victoria; or, figures and descriptions of the living species of all classes of the Victorian indigenous animals*. 5, 1–58, pls 41–50.
- McKeown, K.C. (1944) Australian insects. XX. Hemiptera–Homoptera–The cicadas (continued). *Australian Museum Magazine*, 8(7), 234–237.
- Metcalf, Z.P. (1944) List of journals and topical index. *A bibliography of the Homoptera (Auchenorrhyncha)* 2, 1–186.
- Metcalf, Z.P. (1947) The center of origin theory. *Journal of the Elisha Mitchell Scientific Society*, 62, 149–175, pls 23–41.
- Metcalf, Z.P. (1963) *General catalogue of the Homoptera*. Fasc. 8. Cicadoidea. Part 1: Cicadidae; vii, 919 pages. Part 2: Tibicinidae; vi, 492 pages. [Species index by Virginia Wade, 1964, 26 pp.] University of North Carolina State College, Raleigh, U.S.A.
- Moss, J.T.St.L. (1989) Notes on the Tasmanian cicada fauna with comments on its uniqueness. *Queensland Naturalist*, 29, 102–106. [Reprinted, 2000, in *Invertebrata* 16, 6–8.]
- Moss, J.T.St.L. and Moulds, M.S. (2000) A new species of *Psaltoda* Stål, with notes on comparative morphology and song structure (Hemiptera: Cicadidae). *Australian Entomologist*, 27, 47–60.
- Moss, J.T.St.L. and Popple, L.W. (2000) Cicada, butterfly and moth records from the Gibraltar Range, New South Wales (Hemiptera: Cicadidae; Lepidoptera). *Queensland Naturalist*, 38, 53–60.
- Moulds, M.S. (1978) A new species of *Henicopsaltria* Stål (Homoptera: Cicadidae) from north Queensland. *Journal of the Australian Entomological Society*, 17(3), 225–228.
- Moulds, M.S. (1984) *Psaltoda magnifica* sp.n. and notes on the distribution of other *Psaltoda* species (Homoptera: Cicadidae). *General and Applied Entomology*, 16, 27–32.
- Moulds, M.S. (1985) *Illyria*, a new genus for Australian cicadas currently placed in *Cicada* L. (= *Tettigia* Amyot) (Homoptera: Cicadidae). *General and Applied Entomology*, 17, 25–35.
- Moulds, M.S. (1986) *Marteena*, a new genus for the cicada *Tibicen rubricinctus* Goding and Froggatt (Homoptera: Tibicinidae). *General and Applied Entomology*, 18, 39–41.
- Moulds, M.S. (1987) The specific status of *Pauropsalta nigristriga* Goding and Froggatt (Homoptera: Cicadidae) with the description of an allied new species. *Australian Entomological Magazine*, 14(1,2), 17–22.
- Moulds, M.S. (1988) The status of *Cicadetta* and *Melampsalta* (Homoptera: Cicadidae) in Australia with the description of two new species. *General and Applied Entomology*, 20, 39–48.
- Moulds, M.S. (1990) *Australian cicadas*. New South Wales University Press, Kensington. 217 pp., 24 pls.
- Moulds, M.S. (1992) Two new species of *Macrotristria* Stål (Hemiptera: Cicadidae) from Queensland. *Australian Entomological Magazine*, 19(4), 133–138.
- Moulds, M.S. (1993) *Henicopsaltria danielsi* sp.n. and a new locality for *H. eydouxii* (Hemiptera: Auchenorrhyncha: Cicadidae). *General and Applied Entomology*, 25, 23–26.
- Moulds, M.S. (1994) The identity of *Burbunga gilmorei* (Distant) and *B. inornata* Distant (Hemiptera: Cicadidae) with descriptions of two allied new species. *Journal of the Australian Entomological Society*, 33, 97–103.
- Moulds, M.S. (1996) Review of the Australian genus *Gudanga* Distant (Hemiptera: Cicadidae) including new species from Western Australia and Queensland. *Journal of the Australian Entomological Society*, 35, 19–31.
- Moulds, M.S. (2001) A review of the Thophini Distant (Hemiptera: Cicadoidea: Cicadidae) with the description of a new species of *Thopha* Amyot & Serville. *Insect Systematics and Evolution*, 31, 195–203.
- Moulds, M.S. (2002) Three new species of *Psaltoda* Stål from eastern Australia (Hemiptera: Cicadoidea: Cicadidae). *Records of the Australian Museum*, 54, 325–334.
- Moulds, M. S. (2003) An appraisal of the cicadas of the genus *Abricta* Stål and allied genera (Hemiptera: Auchenorrhyncha: Cicadidae). *Records of the Australian Museum*, 55, 245–304.
- Moulds, M.S. (2005a) An appraisal of the higher classification of cicadas (Hemiptera: Cicadoidea) with special reference to the Australian fauna. *Records of the Australian Museum*, 57, 375–446. [http://www.amonline.net.au/pdf/publications/1447\\_complete.pdf](http://www.amonline.net.au/pdf/publications/1447_complete.pdf)



- Moulds, M.S. (2005b) Song analyses of cicadas of the genera *Aleeta* Moulds and *Tryella* Moulds (Hemiptera: Cicadidae). *Proceedings of the Linnean Society of New South Wales*, 126, 133–142.
- Moulds, M.S. (2008a) *Thopha hutchinsoni*, a new cicada (Cicadoidea: Cicadidae) from western Australia, with notes on the distribution and colour polymorphism of *Thopha sessiliba* Distant. *Australian Entomologist*, 35, 129–140.
- Moulds, M.S. (2008b) Talcopsaltriini, a new tribe for a new genus and species of Australian cicada (Hemiptera: Cicadoidea: Cicadidae). *Records of the Australian Museum*, 60, 207–214.  
[http://www.amonline.net.au/pdf/publications/1496\\_complete.pdf](http://www.amonline.net.au/pdf/publications/1496_complete.pdf)
- Moulds, M.S. (2010) *Platypleura tepperi* Goding & Froggatt, 1904 (Cicadoidea: Cicadidae), a Madagascan cicada erroneously recorded from Australia. *Australian Entomologist*, 37, 11–12.
- Moulds, M.S. and Carver, M. (1991) Superfamily Cicadoidea. In: *The insects of Australia. A textbook for students and research workers*. Second edition. Vol. 1, pp. 465–467. Melbourne University Press, Carlton.
- Moulds, M.S. and Hangay, G. (1998) First record of the bladder cicada *Cystosoma saundersii* (Westwood) from Lord Howe Island (Hemiptera: Cicadidae). *Australian Entomologist*, 25(3), 75–76.
- Moulds, M.S. and Kopestonsky, K.A. (2001) A review of the genus *Kobonga* Distant with the description of a new species (Hemiptera: Cicadidae). *Proceedings of the Linnean Society of New South Wales*, 123, 141–157.
- Moulds, M.S. and Owen, C.L. (2011) *Pauropsalta walkeri*, a new species of cicada (Homoptera: Cicadidae: Cicadinae) from northern Australia. *Australian Entomologist*, 38, 145–154.
- Moulton, J.C. (1923) Cicadas of Malaysia. *Journal of the Federated Malay States Museum*, 11, 69–182, pls 1–5.
- Muir, F.A.G. (1930) Notes on certain controversial points of morphology of the abdomen and genitalia of Psyllidae. *Annals and Magazine of Natural History*, (10)5, 545–552.
- Myers, J.C. (1921) A revision of the New Zealand Cicadidae (Homoptera), with descriptions of new species. *Transactions and Proceedings of the New Zealand Institute*, 53, 238–250, pls 45–46.
- Myers, J.G. (1922) The order Hemiptera in New Zealand, with special reference to its biological and economic aspects. *New Zealand Journal of Science and Technology*, 5, 1–12.
- Myers, J.G. (1923) New species of New Zealand Cicadidae. *Transactions and Proceedings of the New Zealand Institute*, 54, 430–431.
- Myers, J.G. (1928a) Cicadidae. *Insects of Samoa and other Samoan terrestrial Arthropoda*, 2(2), 55–65.
- Myers, J.G. (1928b) The morphology of the Cicadidae (Homoptera). *Proceedings of the Zoological Society of London*, 1928, 365–472.
- Myers, J.G. (1929a) The taxonomy, phylogeny, and distribution of New Zealand Cicadas (Homoptera). *Transactions of the Royal Entomological Society of London*, 77, 29–60, pls 2–4.
- Myers, J.G. (1929b) *Insect singers. A natural history of the cicadas*. xix, 304 pp., pls I–VII.
- Naruse, K. and Nakane, T. (1971) [On the cicadas of the Bonin Islands (Hemiptera: Cicadidae)]. *Proceedings of the Japanese Society for Systematic Zoology*, 7, 61–64. [In Japanese.]
- Nast, J. (1972) *Palearctic Auchenorrhyncha (Homoptera). An annotated check list*. 550 pp. [Cicadas pp. 136–156], Polish Scientific Publishers, Warszawa.
- Neave, S.A. (1939a) *Nomenclator zoologicus. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus 1758 to the end of 1935*. Zoological Society of London, Regent's Park. 1, v–xiv, 1–957.
- Neave, S.A. (1939b) *Nomenclator zoologicus. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus 1758 to the end of 1935*. Zoological Society of London, Regent's Park. 2, 1–1025.
- Neave, S.A. (1940a) *Nomenclator zoologicus. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus 1758 to the end of 1935*. Zoological Society of London, Regent's Park. 3, 1–1065.
- Neave, S.A. (1940b) *Nomenclator zoologicus. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus 1758 to the end of 1935*. Zoological Society of London, Regent's Park. 4, 1–758.
- Nel, A. (1996) Un Tettigarctidae fossile du Lias européen (Cicadomorpha, Cicadoidea, Tettigarctidae). *Ecole pratique des hautes Etudes, Biologie et Evolution des Insectes*, 9, 83–94.
- Nixon, K. C. (1992) *Clados version 1.2*. Computer program and reference manual. Privately published by the author.
- Olive, J.C., 2007. A new species of *Gudanga* Distant (Hemiptera: Cicadidae) from northern Queensland. *Australian Entomologist*, 34, 1–6.
- Orian, A.J.E. (1954) A synopsis of the Cicadidae of Mauritius, with a description of *Mauricia claudae*, gen. et. sp. n. *Annals and Magazine of Natural History*, (12)7, 233–237, pl. V.
- Oshanin, V.T. (1906) Verzeichnis der paläarktischen Hemipteren mit besonderer Berücksichtigung ihrer Verteilung im Russischen Reiche. II. Band. Homoptera. I. Lieferung. *Annuaire de Musée Zoologique de l'Académie Impériale des Sciences de St.-Petersbourg*, 1, i–xvi, 1–192.
- Oshanin, V.T. (1908) Verzeichnis der paläarktischen Hemipteren mit besonderer Berücksichtigung ihrer Verteilung im Russischen Reiche. II. Band. Homoptera. III. Lieferung. *Annuaire de Musée Zoologique de l'Académie Impériale des Sciences de St.-Petersbourg*, 13, 385–492.
- Oshanin, V.T. (1912) *Katalog der paläarktischen Hemipteren (Heteroptera, Homoptera–Auchenorrhyncha und Psylloidea)*. Pp. i–xvi, 1–187.
- Ossiannilsson, F. (1949) Insect drummers. A study on the morphology and function of the sound-producing organ of Swedish

- Homoptera Auchenorrhyncha with notes on their sound-production. *Opuscula Entomologica. Supplementum*, 10, 1–145.
- Ouchi, Y. (1938) Contributions ad cognitionem insectum Asiae Orientalis. V. A preliminary note on some Chinese cicadas with two new genera. *Journal of the Shanghai Science Institute*, (3)4, 75–111, pls V–VI.
- Overmeer, W.P.J. and Duffels, J.P., (1967) A revisionary study of the genus *Dundubia* Amyot and Serville (Homoptera, Cicadidae). *Beaufortia*, 14(166), 29–59.
- Pesson, P. (1951) Ordre des Homoptères (Homoptera Leach, 1815). *Traité de zoologie. Anatomie, systématique, biologie*, 10, 1390–1656.
- Piton, L. and Theobald, N. (1937) Les insectes fossiles de Menat. *Revue des Sciences Naturelles d'Auvergne*, (n.s.)3, 76–88.
- Popov, A.V. (1975a) The structure of the timbals and the characteristics of the sound signals in singing cicadas (Homoptera, Cicadidae) in the southern regions of the USSR. *Entomological Review, Washington*, 54(2), 7–35. [A translation of Popov, 1975b]
- Popov, A.V. (1975b) The structure of the timbals and characteristics of sound signals of singing cicadas (Homoptera, Cicadidae) from the southern regions of the USSR. *Entomologicheskoe Obozrénie*, 54(2), 258–290.
- Popple, L.W. (2003) A new species of *Cicadetta* Amyot (Hemiptera: Cicadidae) from Queensland, with notes on its calling song. *Australian Entomologist*, 30, 107–114.
- Popple, L.W. and Emery, D.L. (2010) A new cicada genus and a redescription of *Pauropsalta subolivacea* Ashton (Hemiptera: Cicadidae) from eastern Australia. *Australian Entomologist*, 37: 147–156.
- Popple, L.W. and Strange, A.D. (2002). Cicadas, and their songs, from the Tara and Waroo Shires, southern central Queensland. *Queensland Naturalist*, 40: 15–30.
- Popple, L.W., Walter, G.H. and Raghu, S. (2008) The structure of calling songs in the cicada *Pauropsalta annulata* Goding and Froggatt (Hemiptera: Cicadidae): evidence of diverging populations? *Evolutionary Ecology*, 22, 203–215.
- Pringle, J.W.S. (1957) The structure and evolution of the organs of sound-production in cicadas. *Proceedings of the Linnean Society of London*, 167, 144–159.
- Puissant, S. and Sueur, J. (2010). A hotspot for Mediterranean cicadas (Insecta: Hemiptera: Cicadidae): new genera, species and songs from southern Spain. *Systematics and Biodiversity*, 8, 555–574.
- Schmidt, E. (1925) Zwei neue Singcicaden von der Insel Sumba. *Societas Entomologica*, 40, 42–43.
- Schmidt, E. (1926) Fauna Buruana. Homoptera. *Treubia*, 7, 217–258.
- Schmidt, E. (1928) Die Zikaden des Buitenzorger Museums. (Hemipt.–Homopt.). I. *Treubia*, 10, 107–144.
- Schremmer, F. (1957) Singzikaden. *Neue Brehm Bücherei*, 193, 1–47. A. Ziemsen Verlag, Wittenberg-Lutherstadt
- Schulze, F.E., Kükenthal, W. and Heider, K. (1926–40) *Nomenclator animalium generum et subgenerum. Im Auftrage der Preussische Akademie der Wissenschaften zu Berlin*, 1(1)–5(25), 1–3692, I–CCCXLIV.
- Seabra, A.F. de (1942) Contribuições para o inventário da fauna lusitânica. Insecta Homoptera (Cicadoidea e Fulgoroidea). *Memórias e Estudos do Museu Zoológica da Universidade de Coimbra*, 121, 1–14.
- Shcherbakov, D.E. (2009) Review of the fossil and extant genera of the cicada family Tettigarctidae (Hemiptera: Cicadoidea). *Russian Entomological Journal* 17, 343–348.
- Signoret, V. (1860) Faune des Hémiptères de Madagascar. 1re partie. Homoptères. *Annales de la Société entomologique de France*, (3)8, 177–206, pls 4–5.
- Signoret, V. (1891) Descriptions de quelques Hémiptères nouveaux du Sénégal. *Annales de la Société Entomologique de France*, 60, 467–472.
- Singh-Pruthi, H. (1925) The morphology of the male genitalia in Rhynchota. *Transactions of the Royal Entomological Society of London*, 1925, 127–267, pls 6–32.
- Smith, S. (2010) An extension to the range of *Cicadetta spinosa* (Goding and Froggatt) (Cicadidae) to central Victoria. *Victorian Entomologist*, 40, 112.
- Spinola, M. (1850) Tavola sinotticva dei generi spettanti alla classe degli insetti artroidignati, Hemiptera, Linn. Latr.–Rhynchota, Fab.–Rhynchota, Burm. *Memorie della Società Italiana delle Scienze residente in Modena*, 25(1), 1–60. [Reprinted, 1852, *Memorie di Matematica e di Fisica della Società Italiana delle Scienze*, 25(1), 90–99.]
- Stål, C. (1855) Hemiptera från Kafferlandet. *Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar, Stockholm*, 12, 89–100
- Stål, C. (1861) Genera nonnulla nova Cicadinorum. *Annales de la Société Entomologique de France*, (4)1, 613–622.
- Stål, C. (1862a) Synonymiska och systematiska anteckningar ofver Hemiptera. *Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar, Stockholm*, 19, 479–504.
- Stål, C. (1862b) Bidrag till Rio Janeiro-traktens Hemipter-fauna. II. *Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar, Stockholm*, 3(6), 1–75.
- Stål, C. (1863a) Hemipterorum exoticorum generum et specierum nonnullarum novarum descriptiones. *Transactions of the Royal Entomological Society of London*, (3)1, 571–603.
- Stål, C. (1863b) Synonymiska och systematiska anteckningar öfver Hemiptera. *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar*, 19, 479–504.
- Stål, C. (1866a) *Hemiptera Africana*. Hemiptera Homoptera Latr. Vol. 4. 276 pages, 1 pl. Officina Norstedtiana, Holmiae.
- Stål, C. (1866b) *Analecta Hemipterologica*. *Berliner Entomologische Zeitschrift*, 10, 151–172.
- Stål, C. [1870a] Hemiptera Fabriciana. Fabricianska Hemipterarter efter de i Köpenhamn och Kiel förvarade typexemplaren granskade och beskrifne. 2. *Handlingar Kongliga Svenska Vetenskaps Akademiens, Stockholm*, 8(1), 1–130. [Title page

dated 1869 but this issue not published until 1870.]

- Stål, C. (1870b) Hemiptera insularum Philippinarum. Bidrag till Philipppionska öarnes Hemipter-fauna. *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar*, Stockholm 27, 607–776, pls VII–IX.
- Steinbauer, M.J. (1997) Notes on *Psaltoda moerens* (Germar) (Hemiptera: Cicadidae) in Tasmania. *Australian Entomologist*, 24 169–171.
- Swofford, D. L. (1998) PAUP\* 4.0. *Phylogenetic analysis using parsimony*. Beta version 4.0b2. Smithsonian Institution.
- Tillyard, R. J. (1926) *The insects of Australia and New Zealand*. Angus & Robertson, Sydney. 560 pp., 44 pls.
- Walker, F. (1850) *List of the specimens of homopterous insects in the collection of the British Museum*. Part 1. British Museum, London. Pp. 1–260.
- Walker, F. (1852) *List of the specimens of homopterous insects in the collection of the British Museum*. Part 4. British Museum, London. Pp. 908–1188.
- Walker, F. (1858a) Homoptera. *Insecta saundersiana: or characters of undescribed insects in the collection of William Wilson Saunders, Esq.* 2, 1–117.
- Walker, F. (1858b) *List of the specimens of homopterous insects in the collection of the British Museum*. Supplement. British Museum, London. Pp. [i–ii], 1–369.
- Walker, F. (1862) Characters of undescribed species of Homoptera in the collection of F. P. Pascoe, F. L. S. *Journal of Entomology* 1(5), 303–319, pl. 15.
- Walker, F. (1868) Catalogue of the homopterous insects collected in the Indian Archipelago by Mr. A.R. Wallace, with descriptions of new species. *Journal and Proceedings of the Linnean Society of London*, 10, 82–193, pl. 3.
- Walker, F. (1870) Catalogue of the homopterous insects collected in the Indian Archipelago by Mr A.R. Wallace, with descriptions of new species. *Journal and Proceedings of the Linnean Society of London* 10, 82–193, pl. 3.
- Waterhouse, C.O. (1902) *Index zoologicus. An alphabetical list of names of genera and subgenera proposed for use in zoology as recorded in the "Zoological Record" 1880–1900, together with other names not included in the "Nomenclator Zoologicus" of S.H. Scudder*. xii, 421 pp.
- Weidner, H. and Wagner, W. (1968) Die entomologischen Sammlungen des Zoologischen Staatsinstitut und Zoologischen Museum, VII. Teil, Insecta IV. *Mitteilungen aus den Hamburgischen Zoologischen Museum und Institut* 65, 123–180.
- Westwood, J.O. (1840) Order Homoptera Macleay. In: *An introduction to the modern classification of insects; founded on the natural habits and corresponding organisation of the different families*. Vol. 2. Longman, Orme, Brown, Green and Longmans, London. Pp. 414–450.
- Westwood, J.O. (1842a) Illustrations of some genera belonging to the family Cicadidae. *Arcana entomologica or illustrations of new, rare, and interesting insects*. 1, 91–92, pl. 24.
- Westwood, J.O. (1842b) Insectorum novorum centuria, auctore. *Annals and Magazine of Natural History* 9, 118–119.
- Westwood, J.O. (1843) Descriptions of some Homopterous insects from the East Indies. *Arcana entomologica or illustrations of new, rare, and interesting insects* 2, 33–35, pl. 57.
- Westwood, J.O., (1851) Descriptions of some new species of exotic Homopterous insects. *Annals and Magazine of Natural History* (2)7, 207–210.
- Whalley, P.E.S. (1983) A survey of Recent and fossil cicadas (Insecta, Hemiptera–Homoptera) in Britain. *Bulletin of the British Museum of Natural History (Geology)* 37, 139–147.
- White, A. (1845) Descriptions and figures of four new species of Australian insects. In: Eyre, E.J., *Journals of expeditions of discovery into Central Australia, and overland from Adelaide to King George's Sound in the years 1840–1; sent by the colonists of South Australia, with the sanction and support of the Government: including an account of the manners and customs of the aborigines and the state of their relations with Europeans*. Vol. I. Appendix D. Pp. 432–434, pl. 4.
- White, A. (1846) Descriptions of some apparently new species of Homopterous insects in the collection of the British Museum. *Annals and Magazine of Natural History* 17, 330–333.
- Wise, K.A.J. (1977) A synonymic checklist of the Hexapoda of the New Zealand sub-region. The smaller orders. *Bulletin of the Auckland Institute and Museum* 11, 1–176. [Cicadas pp. 71–76.]
- Woodward, T.E., Evans, J.W. and Eastop, V.F. (1970) Chapter 26, Hemiptera (bugs, leafhoppers, etc.). In: *Insects of Australia*. Melbourne University Press, Clayton, pp. 387–457, pl. 3.
- Wootton, R. (1971) The evolution of Cicadoidea (Homoptera). *Proceedings of the 13th International Congress of Entomology*, 1, 318–319.
- Wu, C.F. (1935) Order XV. Homoptera. In: *Catalogus insectorum sinensium*. (Catalogue of Chinese insects.) 2, 1–124.
- Young, D. (1972) Analysis of songs of some Australian cicadas (Homoptera: Cicadidae). *Journal of the Australian Entomological Society* 11, 237–243.
- Young, D. (1973) Sound production in cicadas. *Australian Natural History*, 17(11), 375–380.
- Young, D. (1975) Chordotonal organs associated with the sound apparatus of cicadas (Insecta, Homoptera). *Zeitschrift für Morphologie der Tiere*, 81(2), 111–136.
- Young, D. and Josephson, R.K. (1983) Mechanisms of sound-production and muscle contraction kinetics in cicadas. *Journal of Comparative Physiology*, 152, 183–195.
- Zeuner, F.E. (1944) Notes on Eocene Homoptera from the Isle of Mull, Scotland. *Annals and Magazine of Natural History* (11)11, 110–117.

## SYSTEMATIC INDEX

- aaede*, *Cicadetta* 74  
*aaede*, *Yoyetta* 24, 237  
*abbreviata*, *Cicada* 190, 219  
*abbreviata*, *Melampsalta* 190, 219  
*abdominalis*, *Cicadetta* 74  
*abdominalis*, *Yoyetta* 24, 237  
*Abricta* 7, 46  
*adamsi*, *Gudanga* 23, 119, 121  
*adela*, *Tryella* 23, 229  
*adelaida*, *Cicadetta* 17, 20, 74  
*adelaida*, *Clinopsalta* 24, 42, 78, 79  
*adelaida*, *Melampsalta* 78  
*Adelia* 20, 23, 32, 46–48, 95  
*adipata*, *Acrilla* 222  
*adipata*, *Thaumastopsaltria* 222  
*adonis*, *Psaltoda* 22, 192, 194  
*aktites*, *Pauropsalta* 23, 176  
*albofasciata*, *Burbunga* 22, 28, 62  
*Aleeta* 7, 23, 32, 49–50, 231  
*Anapsaltoda* 22, 27, 51–52, 158, 194  
*angularis*, *Cicada* 144  
*angularis*, *Macrotristria* 22, 144, 145, 146  
*angusta*, *Kikihia* 135  
*annulata*, *Pauropsalta* 23, 176  
*antennetta*, *Psaltoda* 22, 192, 194  
*apicans*, *Kobonga* 18, 20, 24, 137, 139  
*apicata*, *Cicadetta* 17, 20, 74  
*apicata*, *Kobonga* 24, 137, 139  
*aquila*, *Pauropsalta* 23, 176  
*arenaria*, *Cicadetta* 74  
*arenaria*, *Melampsalta* 204  
*arenaria*, *Sylphoides* 24, 34, 44, 45, 204, 205  
*Arenopsaltria* 22, 27, 28, 30, 53–55  
*argentata*, *Tettigettalna* 14, 18, 20  
*Arunta* 22, 28, 55–57, 226  
*aterrima*, *Burbunga* 22, 62  
*aterrima*, *Macrotristria* 144  
*atkinsoni*, *Oxypleura* 165  
*atrata*, *Myopsalta* 151, 154  
*atrata*, *Myopsalta* 24, 162  
*atrata*, *Notopsalta* 16, 18, 19, 21, 162  
*auranti*, *Gagatopsalta* 18, 20, 24, 108, 109  
*aurata*, *Abricta* 95  
*aurata*, *Cicada* 95  
*auratus*, *Tibicen* 95  
*aurea*, *Gudanga* 23, 119  
*auriculate*, *Diceropyga* 90  
*aurita*, *Diceropyga* 90  
*aurora*, *Psaltoda* 22, 192  
*Auscala* 24, 42, 57–59  
*australasiae*, *Cyclochila* 22, 83, 84, 85  
*australasiae*, *Tettigonia* 83  
*australensis*, *Illyria* 22, 130  
*ayrensis*, *Pauropsalta* 23, 176  
*bacanensis*, *Diceropyga* 90  
*Baeturia* 7, 59  
*basalis*, *Nanopsalta* 23, 34, 36, 154, 155, 156, 178  
*basalis*, *Oxypleura* 165  
*basalis*, *Pauropsalta* 154, 178  
*basiflamma*, *Cicada* 115  
*bellatrix*, *Cicadetta* 17, 20  
*bellatrix*, *Pauropsalta* 178, 182  
*bellatrix*, *Physeema* 24, 178, 179, 182  
*bicornis*, *Diceropyga* 90  
*bihamata*, *Diceropyga* 90  
*bindalia*, *Macrotristria* 13, 22, 144  
*binotata*, *Cicadetta* 16, 17, 21, 74  
*binotata*, *Myopsalta* 24, 151  
*Birrima* 24, 40, 43, 46, 59–61, 206  
*bolloni*, *Graminitigrina* 23, 117  
*borealis*, *Abricta* 17, 19, 20, 46, 47  
*borealis*, *Adelia* 23, 32, 46, 50  
*borealis*, *Pauropsalta* 23, 176  
*bougainvillensis*, *Diceropyga* 90  
*boulayi*, *Gudanga* 17, 20, 23, 119, 120  
*bowensis*, *Graminitigrina* 23, 117, 118, 119  
*brachypennis*, *Psaltoda* 22, 192  
*brendelli*, *Lembeja* 139  
*brevis*, *Cicadetta* 17, 21, 74  
*brevis*, *Ewartia* 25, 44, 45, 103, 105  
*browni*, *Gudanga* 23, 119  
*bufo*, *Oxypleura* 165  
*Burbunga* 22, 27, 28, 62–64, 131, 176  
*Burbungini* 5, 22, 25, 26, 176  
*burgessi*, *Abricta* 46, 211  
*burgessi*, *Tamasa* 22, 209, 211  
*burkei*, *Illyria* 22, 130, 131, 132,  
*burkei*, *Tibicen* 130  
*burnsi*, *Tryella* 23, 229  
*Caliginopsalta* 7, 14, 19, 20, 24, 40, 64–67, 179  
*calypso*, *Oxypleura* 21, 28, 165, 166  
*canescens*, *Oxypleura* 165  
*capistrata*, *Cicadetta* 74, 212  
*capistrata*, *Melampsalta* 212  
*carnarvonensis*, *Graminitigrina* 23, 117  
*castanea*, *Birrima* 24, 60, 61, 62  
*castanea*, *Cicadetta* 62  
*castanea*, *Melampsalta* 59, 60  
*castanea*, *Pauropsalta* 13  
*castanea*, *Tryella* 23, 229  
*cauta*, *Kikihia* 135  
*celis*, *Cicadetta* 74, 237  
*celis*, *Yoyetta* 24, 237, 238, 239  
*centralis*, *Oxypleura* 165  
*cervina*, *Oxypleura* 165  
*ceuthoviridis*, *Pipilopsalta* 18, 20, 24, 40, 76, 184, 185  
*Chelapsalta* 20, 24, 38, 43, 44, 45, 46, 67–69  
*chinae*, *Guineapsaltria* 123  
*Chlorocysta* 25, 69–71, 117  
*Chlorocystini* 5, 25, 26, 71, 126, 224, 237  
*Chrysocicada* 7, 23, 32, 71–73  
*Cicada* 6



*Cicadetta* 5, 7, 14, 19, 73–75, 148, 149, 176  
*Cicadettinae* 5, 11, 12, 23, 25, 26  
*Cicadettini* 5, 14, 21, 23, 26, 75, 122, 136, 148, 162, 200  
*Cicadidae* 5, 6, 21, 25, 27, 86, 90, 137, 199  
*Cicadinae* 5, 8, 9, 10, 12, 21, 25, 27  
*Cicadini* 5, 21, 22, 26, 83, 84, 207, 220  
*Cicadoidea* 21, 25, 26, 83, 84, 207, 220  
*ciliata*, *Tettigarcta* 21, 220  
*cincta*, *Abrieta* 46, 95  
*cincta*, *Cicada* 95  
*cincta*, *Diemeniana* 18, 20, 23, 92, 95  
*cincta*, *Tettigonia* 95  
*cinctus*, *Tibicen* 95  
*circumdata*, *Palapsalta* 23, 167, 169, 178  
*circumdata*, *Pauropsalta* 169, 178  
*clara*, *Oxypleura* 165  
*claripennis*, *Psaltoda* 22, 192  
*Clinata* 21, 24, 34, 36, 76–78, 227  
*Clinopsalta* 20, 24, 38, 42, 78–80, 112  
*coleoptrata*, *Cicada* 92  
*collina*, *Pauropsalta* 23, 176  
*colorata*, *Thopha* 22, 224  
*connexa*, *Cicada* 115  
*conspersa*, *Quintilia* 199  
*convergens*, *Cicadetta* 15, 17, 19, 20, 74  
*convergens*, *Physeema* 24, 38, 179, 180  
*convicta*, *Kikihia* 23, 43, 45, 135, 137  
*corticina*, *Pauropsalta* 23, 176  
*Cosmopsaltriina* 22, 26  
*crassa*, *Lembeja* 139  
*crassa*, *Neopsaltoda* 12, 22, 156, 157  
*crassa*, *Tryella* 23, 229  
*crepitum*, *Drymopsalta* 18, 19, 21, 24, 98, 99  
*crinita*, *Tettigarcta* 11, 219, 220, 221  
*Crotopsalta* 7, 19, 21, 24, 36, 43, 45, 80–82  
*crucifera*, *Cicadetta* 15, 17, 21, 74  
*crucifera*, *Melampsalta* 151  
*crucifera*, *Myopsalta* 24, 151, 152, 153, 154  
*cruentata*, *Rhodopsalta* 18, 20  
*Cryptotympanini* 22, 26  
*cuensis*, *Cicadetta* 17, 21, 74  
*cuensis*, *Ewartia* 25, 76, 103, 105  
*curvicosta*, *Abrieta* 46  
*curvicosta*, *Aleeta* 11, 23, 32, 49, 50  
*curvicosta*, *Cicada* 49  
*cutora*, *Kikihia* 135  
*Cyclochila* 22, 28, 83–85  
*Cyclochilini* 5, 22, 26, 84  
*Cystopsaltia* 25, 30, 84, 85–86, 88, 90, 224  
*Cystosoma* 6, 25, 30, 86, 88–90, 224  
*daemeli*, *Drymopsalta* 18, 21, 24, 98, 100  
*daemeli*, *Urabunana* 100  
*dahli*, *Gymnotympana* 124  
*damater*, *Cicada* 115  
*damater*, *Melampsalta* 115  
*danielsi*, *Henicopsaltia* 22, 128  
*dekkeri*, *Lembeja* 139  
*denisoni*, *Cicadetta* 74  
*denisoni*, *Yoyetta* 24, 237  
*Diceropyga* 22, 30, 90–92  
*didyma*, *Diceropyga* 90  
*Diemeniana* 19, 20, 23, 32, 92–95  
*Dipsopsalta* 20, 24, 36, 95–98, 151, 170, 186  
*distanti*, *Lembeja* 139  
*doddi*, *Macrotristria* 22, 144  
*doddi*, *Tamasa* 22, 209, 210, 211  
*dolens*, *Pauropsalta* 23, 176  
*dorsalis*, *Macrotristria* 22, 144  
*douglasi*, *Macrotristria* 22, 144  
*Drymopsalta* 7, 14, 21, 24, 36, 42, 44, 46, 98–100  
*dubia*, *Pauropsalta* 14, 16, 18, 21, 178, 186  
*dubia*, *Platypsalta* 24, 178, 186, 188, 189  
*dugdalei*, *Kikihia* 135  
*elgneri*, *Pauropsalta* 23, 176  
*elongata*, *Lembeja* 139  
*emma*, *Mugadina* 149, 178  
*emma*, *Pauropsalta* 178  
*emma*, *Urabunana* 14, 18, 20, 24  
*emmotti*, *Thopha* 22, 224  
*encaustica*, *Pauropsalta* 23, 176  
*Erempsalta* 20, 24, 32, 38, 40, 100–103  
*ethiopiensis*, *Oxypleura* 165  
*euronotiana*, *Abrieta* 95  
*euronotiana*, *Diemeniana* 18, 20, 23, 92, 95  
*Ewartia* 21, 25, 36, 40, 43, 44, 45, 103–105  
*exaequata*, *Pauropsalta* 176  
*extensa*, *Pauropsalta* 23, 176  
*extrema*, *Macrotristria* 22, 144  
*extrema*, *Pauropsalta* 23, 176  
*exulis*, *Kikihia* 135  
*eydouxii*, *Cicada* 128  
*eydouxii*, *Henicopsaltia* 22, 53, 128, 129, 130  
*eyrei*, *Melampsalta* 167  
*eyrei*, *Palapsalta* 23, 167, 168, 178  
*eyrei*, *Pauropsalta* 169, 178  
*fatiloqua*, *Lembeja* 139  
*festiva*, *Mugadina* 24, 149, 151, 231  
*festiva*, *Urabunana* 14, 18, 20, 231  
*Fijipsalta* 200  
*flava*, *Baeturia* 59  
*flava*, *Guineapsaltia* 25, 122, 123  
*flava*, *Tibicen* 122  
*flaveola*, *Guineapsaltia* 123  
*flavescens*, *Psaltoda* 22, 192  
*foliata*, *Lembeja* 139  
*forresti*, *Cicadetta* 74, 212  
*forresti*, *Melampsalta* 211, 212  
*forresti*, *Taurella* 24, 211, 212, 213  
*franceaustraliae*, *Chrysocicada* 23, 32, 71, 72, 73  
*frenchi*, *Diemeniana* 18, 20, 23, 92, 94, 95  
*frenchi*, *Macrotristria* 22, 144  
*froggatti*, *Cicadetta* 74, 214  
*froggatti*, *Kobonga* 15, 18, 19, 20, 24, 137, 139  
*froggatti*, *Melampsalta* 214  
*froggatti*, *Taurella* 24, 211, 214  
*Froggattoides* 14, 19, 21, 24, 40, 105–108



*fronsecetes*, *Crotopsalta* 18, 21, 24, 80  
*fruhstorferi*, *Lembeja* 139  
*fullo*, *Arenopsaltria* 22, 53, 54  
*fullo*, *Fidicina* 53  
*fulva*, *Cicadetta* 62, 74  
*fulva*, *Melampsalta* 62  
*fumea*, *Chlorocysta* 25, 69  
*fumipennis*, *Psaltoda* 22, 192  
*fuscata*, *Pauropsalta* 23, 176  
*fuscomarginata*, *Kobonga* 18, 20, 24, 137  
*Gagatopsalta* 7, 14, 19, 20, 24, 43, 44, 45, 108–110  
*Galanga* 19, 20, 24, 38, 110–112  
*geisha*, *Cicadetta* 179  
*geisha*, *Melampsalta* 179  
*Gelidea* 20, 24, 32, 38, 112–115  
*gilmorei*, *Burbunga* 22, 62, 63  
*gilmorei*, *Tibicen* 62  
*glauca*, *Thaumastopsaltria* 222  
*Glaucopsaltria* 25, 30, 71, 115–117  
*globosa*, *Thaumastopsaltria* 25, 30, 222, 223  
*godingi*, *Kobonga* 18, 20, 24, 137  
*godingi*, *Macrotristria* 22, 144  
*graminea*, *Tryella* 23, 229, 231  
*graminis*, *Cicadetta* 74  
*graminis*, *Melampsalta* 158  
*graminis*, *Neopunia* 23, 34, 158, 159  
*Graminitigrina* 7, 23, 34, 36, 117–119, 151, 170  
*gravesteini*, *Diceropyga* 90  
*guadalcanalensis*, *Diceropyga* 90  
*Gudanga* 17, 23, 34, 119–121  
*Guineapsaltria* 7, 25, 32, 121–123  
*guttulata*, *Yanga* 186  
*Gymnotympana* 7, 25, 32, 123–126, 237  
*hackeri*, *Cicadetta* 16, 17, 19, 20, 74  
*hackeri*, *Melampsalta* 214  
*hackeri*, *Telmapsalta* 24, 43, 44, 45, 214, 215, 216  
*harderi*, *Lembeja* 139  
*harrisii*, *Psaltoda* 22, 192  
*Heliopsalta* 20, 24, 28, 30, 44, 46, 126–128  
*Hemidictya* 7  
*Henicopsaltria* 22, 28, 128–130  
*hermannsburgensis*, *Cicadetta* 17, 20, 21, 74, 103  
*hermannsburgensis*, *Erempsalta* 24, 76, 100, 101, 103  
*hermannsburgensis*, *Melampsalta* 101, 103  
*hieroglyphicalis*, *Macrotristria* 22, 144  
*hilli*, *Illyria* 22, 130  
*hillieri*, *Burbunga* 22, 62, 64, 176  
*hillieri*, *Macrotristria* 64, 144  
*hillieri*, *Parnquila* 22, 174, 176  
*hirsuta*, *Diemeniana* 18, 20, 23, 92  
*hirsuta*, *Gymnotympana* 124  
*hollowayi*, *Lembeja* 139  
*horologium*, *Kikihia* 135  
*hunterorum*, *Cicadetta* 74  
*hunterorum*, *Yoyetta* 24, 237  
*hutchinsoni*, *Thopha* 22, 224  
*Illyria* 7, 22, 28, 130–132  
*immaculata*, *Cystopsaltria* 25, 86, 87  
*incepta*, *Cicadetta* 74  
*incepta*, *Yoyetta* 24, 237  
*incipiens*, *Cicada* 190  
*incipiens*, *Cicadetta* 17, 20, 74, 190  
*incipiens*, *Melampsalta* 190  
*incipiens*, *Pauropsalta* 190  
*incipiens*, *Plerapsalta* 24, 189, 190  
*incisa*, *Lembeja* 141  
*infans*, *Cicada* 218  
*infans*, *Quintilia* 18, 19, 20, 199, 219  
*infans*, *Terepsalta* 24, 34, 199, 216, 217, 218, 219  
*infans*, *Tibicen* 219  
*infrasila*, *Pauropsalta* 23, 176  
*infusata*, *Pauropsalta* 23, 176  
*infusata*, *Tryella* 23, 229  
*inornata*, *Burbunga* 22, 62  
*insignis*, *Owra* 25, 30, 163, 164  
*insularis*, *Psaltoda* 22, 192  
*interclusa*, *Arunta* 22, 55  
*intersecta*, *Macrotristria* 22, 144, 146  
*issoides*, *Cicadetta* 15, 17, 21, 74  
*issoides*, *Melampsalta* 160  
*issoides*, *Noongara* 24, 32, 38, 160, 161  
*Jassopsaltria* 22, 30, 133–135  
*Jassopsaltriini* 5, 22, 26, 135  
*johanae*, *Pauropsalta* 176  
*judithae*, *Pauropsalta* 176  
*juncta*, *Cicada* 75, 76  
*juncta*, *Cicadetta* 74, 75  
*juncta*, *Melampsalta* 75  
*junctivitta*, *Diceropyga* 90  
*kabikabia*, *Macrotristria* 22, 144  
*kalgoorliensis*, *Gudanga* 23, 119  
*karumbae*, *Graminitigrina* 23, 117, 119  
*kauma*, *Tryella* 23, 229  
*kelsalli*, *Henicopsaltria* 22, 128  
*Kikihia* 23, 43, 45, 46, 135–137, 206  
*Kobonga* 19, 20, 24, 32, 40, 42, 112, 137–139, 206  
*kulungura*, *Macrotristria* 22, 144  
*labeculata*, *Cicadetta* 17, 20, 74  
*labeculata*, *Galanga* 24, 38, 110, 111  
*labeculata*, *Melampsalta* 110  
*labyrinthica*, *Cicadetta* 17, 20, 74  
*labyrinthica*, *Physeema* 24, 179  
*lachlani*, *Macrotristria* 22, 144  
*lachlani*, *Tryella* 23, 229, 231  
*lactea*, *Cicadetta* 16, 17, 21, 74  
*lactea*, *Myopsalta* 24, 151, 152  
*lanceola*, *Thaumastopsaltria* 222  
*landsboroughi*, *Cicadetta* 74  
*landsboroughi*, *Yoyetta* 24, 237  
*laneorum*, *Kikihia* 135  
*langeraki*, *Gymnotympana* 124  
*Larrakeeya* 106  
*latoea*, *Cicadetta* 17, 19, 20, 74  
*latoea*, *Physeema* 24, 179  
*leichardi*, *Melampsalta* 169, 170, 172  
*leichardi*, *Paradina* 24, 36, 38, 169, 170, 171, 172, 231

*leichardti*, *Pauropsalta* 170  
*leichardti*, *Urabunana* 18, 19, 20, 170, 172, 231  
*Lembeja* 23, 32, 139–141  
*leptotigris*, *Crotopsalta* 18, 21, 24, 80, 81  
*Limnopsalta* 19, 20, 24, 43, 45, 141–144  
*lineatella*, *Oxypleura* 165  
*lineola*, *Melampsalta* 98  
*lineola*, *Pauropsalta* 98, 178  
*longipennis*, *Urabunana* 231, 233  
*longipennis*, *Uradolichos* 23, 34, 231, 233, 234  
*longula*, *Kikihia* 135  
*maccallumi*, *Psaltoda* 22, 192  
*mackinlayi*, *Cicadetta* 17, 21, 74  
*mackinlayi*, *Myopsalta* 24, 151  
*Macrotristria* 7, 22, 27, 28, 64, 144–146  
*maculicollis*, *Macrotristria* 22, 144  
*maculosa*, *Lembeja* 140, 141  
*maculosa*, *Perissoneura* 139  
*madegassa*, *Macrotristria* 144  
*magna*, *Parnkalla* 30, 172, 174  
*magna*, *Parnquila* 22, 172, 174, 175  
*magnifica*, *Psaltoda* 22, 192  
*major*, *Diceropyga* 90  
*major*, *Illyria* 22, 130  
*majuscula*, *Lembeja* 141  
*malaitensis*, *Diceropyga* 90  
*Mardalana* 24, 69  
*marshalli*, *Mugadina* 24, 149, 150, 151, 231  
*marshalli*, *Urabunana* 14, 18, 20, 149, 231  
*Marteena* 7, 14, 23, 34, 146–148  
*Melampsalta* 7, 75, 148–149, 176  
*melanopygia*, *Pauropsalta* 23, 176  
*melete*, *Cicada* 197  
*melete*, *Cicadetta* 17, 20, 74  
*melete*, *Pyropsalta* 24, 42, 44, 45, 197, 198, 199  
*membrana*, *Gymnotypa* 124  
*Meuniera* 220  
*mimica*, *Pauropsalta* 176  
*minahassae*, *Lembeja* 141  
*minima*, *Cicadetta* 74  
*minima*, *Pauropsalta* 195  
*minima*, *Punia* 23, 195, 196, 197  
*minoramembrana*, *Gymnotypa* 124  
*Mirabilopsaltria* 224  
*mirandae*, *Lembeja* 141  
*mixta*, *Cicadetta* 17, 21, 74  
*mixta*, *Pauropsalta* 14  
*mixta*, *Platypsalta* 24, 186, 189  
*mneme*, *Cicada* 176  
*mneme*, *Pauropsalta* 23, 176, 177  
*moerens*, *Cicada* 192  
*moerens*, *Psaltoda* 22, 192, 193  
*montana*, *Cicada* 73  
*montana*, *Cicadetta* 75  
*montana*, *Gymnotypa* 124  
*montivaga*, *Tosena* 84  
*montrouzieri*, *Birrima* 59, 60  
*montrouzieri*, *Cicadetta* 60  
*mossi*, *Psaltoda* 22, 192  
*muelleri*, *Parnkalla* 22, 30, 172, 173, 174  
*muelleri*, *Tibicen* 172  
*Mugadina* 20, 32, 34, 36, 38, 40, 43, 45, 96, 119, 149–151, 170, 186  
*multifascia*, *Cicada* 189, 192  
*multifascia*, *Cicadetta* 17, 20, 74, 192  
*multifascia*, *Melampsalta* 192  
*multifascia*, *Pauropsalta* 192  
*multifascia*, *Plerapsalta* 24, 42, 189, 190, 191  
*murrayensis*, *Cicadetta* 74, 190, 192  
*murrayensis*, *Melampsalta* 190  
*musiva* var. *casgica*, *Melampsalta* 148  
*muta*, *Kikihia* 135  
*Myopsalta* 19, 21, 24, 38, 42, 43, 44, 45, 151–154  
*nanda*, *Burbunga* 22, 62, 64  
*nanda*, *Macrotristria* 144  
*Nanopsalta* 23, 34, 154–156, 160, 179, 195  
*neboissi*, *Diemeniana* 18, 20, 23, 92  
*nebulosa*, *Cicadetta* 74, 179  
*nebulosa*, *Melampsalta* 179  
*nebulosa*, *Pauropsalta* 178  
*Neopsaltoda* 22, 27, 28, 51, 156–158, 194  
*Neopunia* 23, 34, 158–160, 195  
*nigravirgula*, *Gymnotypa* 124  
*Nigripsalta* 200  
*nigristriga*, *Pauropsalta* 23, 176  
*nigrosignata*, *Burbunga* 22, 62  
*nigrosignata*, *Macrotristria* 144  
*noctua*, *Tryella* 23, 229  
*nodicosta*, *Clinata* 24, 34, 36, 76, 77, 178  
*nodicosta*, *Pauropsalta* 18, 21, 76, 178  
*noonadani*, *Diceropyga* 90  
*Noongara* 21, 24, 32, 38, 160–162  
*Notopsalta* 5, 7, 14, 19, 20, 154, 162, 206  
*novaebritannicae*, *Diceropyga* 90  
*novaequinae*, *Diceropyga* 90  
*nubivena*, *Arenopsaltria* 22, 53  
*obiensis*, *Gymnotypa* 124  
*obliterans*, *Diceropyga* 90  
*obscura*, *Gagatopsalta* 18, 20, 24, 108  
*obscurior*, *Cicada* 192  
*obtecta*, *Diceropyga* 90  
*obtecta*, *Tettigonia* 90  
*occidens*, *Tryella* 23, 229  
*occidentalis*, *Abrieta* 46  
*occidentalis*, *Burbunga* 22, 62  
*occidentalis*, *Macrotristria* 144  
*occidentalis*, *Pictila* 23, 30, 182, 183  
*occidentalis*, *Tibicen* 182  
*ochra*, *Tryella* 11, 23, 229, 230, 231  
*ochrina*, *Kikihia* 135  
*ochrothorax*, *Diceropyga* 90  
*oldfieldi*, *Cicadetta* 17, 21, 74  
*oldfieldi*, *Ewartia* 25, 36, 43, 103, 104, 105  
*oldfieldi*, *Melampsalta* 103  
*oligorhanta*, *Lembeja* 141  
*olivacea*, *Gymnotypa* 124

*olivei*, *Talcopsaltria* 21, 28, 206, 207, 208, 209  
*opaca*, *Pauropsalta* 23, 176  
*Owra* 25, 30, 163–164  
*oxleyi*, *Kobonga* 18, 20, 24, 137, 139  
*Oxypleura* 21, 28, 165–167  
*Palapsalta* 23, 40, 43, 44, 45, 167–169, 179  
*pallida*, *Guineapsaltria* 123  
*pallidula*, *Guineapsaltria* 123  
*pallidus*, *Froggattoides* 18, 21, 24, 106, 108  
*papuensis*, *Lembeja* 141  
*Paradina* 20, 24, 36, 38, 151, 169–172  
*paradoxa*, *Lembeja* 23, 139, 141  
*Paragudanga* 7, 119  
*Parnkalla* 22, 30, 172–174, 211  
*Parnquila* 22, 28, 64, 172, 174–176  
*parva*, *Burbunga* 22, 62  
*parvula*, *Gymnotypana* 124  
*Pauropsalta* 5, 7, 14, 19, 23, 34, 40, 44, 45, 65, 120, 149, 156, 169, 176–179, 182  
*paxillulae*, *Kikihia* 135  
*pectinulata*, *Lembeja* 141  
*pennyi*, *Guineapsaltria* 123  
*percola*, *Caliginopsalta* 17, 19, 20, 24, 64, 66  
*Perissoneura* 139  
*perulata*, *Arunta* 10, 12, 22, 55, 56, 57  
*perulata*, *Cicada* 55  
*phyloglycera*, *Gymnotypana* 124  
*Physeema* 20, 24, 38, 42, 43, 46, 112, 179–182  
*pictibasis*, *Psaltoda* 22, 193  
*Pictila* 23, 30, 182–184  
*Pipilopsalta* 7, 14, 20, 24, 38, 40, 96, 151, 170, 184–186  
*plaga*, *Psaltoda* 22, 192  
*Platypleura* 167, 186  
*Platypleurini* 21, 25  
*Platypsalta* 21, 24, 36, 42, 45, 186–189  
*Plerapsalta* 20, 24, 36, 40, 42, 44, 46, 189–192  
*plexis*, *Crotopsalta* 18, 21, 25, 80, 82  
*pneumatica*, *Thaumastopsaltria* 222  
*poaecetes*, *Crotopsalta* 18, 21, 25, 80  
*polita*, *Cicadetta* 17, 20, 74, 126  
*polita*, *Heliopsalta* 24, 44, 46, 126, 127  
*polita*, *Oxypleura* 165  
*polydorus*, *Oxypleura* 165  
*Polyneura* 6  
*Prasiini* 5, 23, 26  
*prolongata*, *Pauropsalta* 23, 176  
*Psaltoda* 22, 27, 28, 51, 158, 192–194  
*pterolongata*, *Gudanga* 23, 119  
*puer*, *Chelapsalta* 24, 38, 43, 44, 45, 67, 68, 69, 204  
*puer*, *Cicada* 67  
*puer*, *Cicadetta* 18, 20, 21, 74  
*pulchra*, *Anapsaltoda* 22  
*pulchra*, *Psaltoda* 51  
*Punia* 23, 34, 158, 160, 195–197  
*Pycna* 84  
*pygmaea*, *Arenopsaltria* 22  
*Pyropsalta* 20, 24, 42, 44, 45, 197–199  
*quadraticollis*, *Oxypleura* 165  
*quadricincta*, *Cicada* 179  
*quadricincta*, *Cicadetta* 18, 20, 74  
*quadricincta*, *Physeema* 24, 179, 180, 181  
*queenslandica*, *Burbunga* 22, 62, 63  
*Quintilia* 5, 19, 73, 199, 218  
*rainbowi*, *Tamasa* 22, 209  
*rennellensis*, *Diceropyga* 90  
*Rhodopsalta* 14, 19, 20  
*richesi*, *Diemeniana* 95  
*robusta*, *Lembeja* 141  
*roehli*, *Lembeja* 141  
*rosea*, *Kikihia* 135  
*rubea*, *Cicadetta* 179  
*rubea*, *Melampsalta* 179  
*rubea*, *Pauropsalta* 23, 176, 178, 179  
*rubra*, *Pauropsalta* 13, 23, 176, 179  
*rubra*, *Tryella* 23, 229  
*rubricata*, *Gymnotypana* 124  
*rubricincta*, *Marteena*  
*rubricinctus*, *Tibicen* 146  
*rubristrigata*, *Pauropsalta* 23, 176  
*rufa*, *Baeturia* 59  
*rufa*, *Gymnotypana* 25, 124, 125, 237  
*rufifacies*, *Jassopsaltria* 23, 133, 134  
*rufifascia*, *Pauropsalta* 176  
*rufivelum*, *Henicopsaltria* 22, 128, 129, 130  
*rufiventris*, *Cicada* 199  
*rufiventris*, *Quintilia* 199  
*saccata*, *Tettigonia* 224  
*saccata*, *Thopha* 22, 224, 225, 226  
*Samaecicada* 7, 23, 40, 199–201  
*sancta*, *Cicadetta* 18, 20, 21, 74, 204  
*sancta*, *Melampsalta* 202, 204  
*sancta*, *Simona* 24, 44, 46, 69, 202, 203, 204  
*sangihensis*, *Lembeja* 141  
*sanguinolenta*, *Lembeja* 141  
*sarissa*, *Thaumastopsaltria* 222  
*saundersii*, *Cystosoma* 6, 25, 88, 89, 90  
*schmeltzi*, *Cystosoma* 25, 88  
*scutellaris*, *Kikihia* 135  
*segmentaria*, *Urabunana* 170, 231  
*sericea*, *Cicada* 162  
*sericea*, *Notopsalta* 18, 20, 162  
*sericeivitta*, *Cicada* 231  
*sericeivitta*, *Urabunana* 24, 231, 232  
*sessiliba*, *Thopha* 22, 224  
*siccana*, *Pauropsalta* 23, 176  
*sicula*, *Thaumastopsaltria* 222  
*signata*, *Dipsopsalta* 24, 36, 95, 97, 98, 178  
*signata*, *Melampsalta* 98  
*signata*, *Pauropsalta* 14, 18, 19, 20, 95, 97, 98, 178  
*Simona* 20, 24, 44, 46, 202–204  
*singula*, *Cicada* 192  
*singula*, *Cicadetta* 74, 192  
*singula*, *Melampsalta* 192  
*solata*, *Gudanga* 23, 119  
*spelunca*, *Thaumastopsaltria* 222  
*spinosa*, *Auscala* 24, 42, 57, 58, 59

*spinosa*, *Cicadetta* 18, 19, 20, 74, 115  
*spinosa*, *Melampsalta* 57, 115  
*spoerryae*, *Oxypleura* 165  
*spreti*, *Cicadetta* 74  
*spreti*, *Melampsalta* 115  
*stalker*, *Tryella* 23, 229  
*stenocephalis*, *Gymnotympana* 124  
*stigmatica*, *Pauropsalta* 13, 23, 176  
*stradbokensis*, *Cicadetta* 18, 19, 20, 74  
*stradbokensis*, *Limnopsalta* 24, 43, 141, 143, 144  
*stradbokensis*, *Melampsalta* 141  
*strenulum*, *Crotopsalta* 18, 21, 25, 80  
*strepitans*, *Cicada* 124  
*strepitans*, *Gymnotympana* 124, 125  
*stridens*, *Gymnotympana* 124  
*stridula*, *Cicada* 186  
*stridula*, *Platypleura* 186  
*stylata*, *Guineapsaltia* 123  
*subalpina*, *Cicada* 135  
*subalpina*, *Kikihia* 135, 136  
*subapicalis*, *Diceropyga* 22, 30, 90, 91  
*subgulosa*, *Cicadetta* 74, 202  
*subgulosa*, *Melampsalta*  
*subjuga*, *Diceropyga* 90  
*subnotata*, *Gymnotympana* 124  
*subolivacea*, *Pauropsalta* 199  
*subolivacea*, *Samaecicada* 23, 40, 199, 201  
*suffusa*, *Chlorocysta* 25, 69, 70  
*sulcata*, *Cicadetta* 74, 214  
*sulcata*, *Melampsalta* 214  
*sulcata*, *Taurella* 212  
*superba*, *Venustria* 25, 32, 34, 235, 236, 237  
*Sylphoides* 24, 34, 44, 45, 204–206  
*sylvana*, *Macrotristria* 22, 144, 145  
*Talcopsaltia* 7, 21, 28, 167, 206–209  
*Talcopsaltiini* 5, 21, 25, 207  
*Tamasa* 22, 30, 172, 209–211  
*Tamasini* 5, 22, 26, 176  
*Taphurini* 5, 23, 26  
*Taurella* 24, 40, 43, 44, 45, 169, 179, 200, 211–214  
*Telmapsalta* 20, 24, 43, 45, 144, 214–216  
*tepperi*, *Platypleura* 186  
*Terepsalta* 19, 20, 24, 34, 216–219  
*Tettigarcta* 13, 21, 27, 84, 219–221  
*Tettigarctidae* 5, 11, 21, 25, 27, 220  
*Tettigarctinae* 21  
*Tettigarctini* 21  
*Tettigettna* 14, 20  
*Thaumastopsaltia* 25, 30, 222–224  
*Thopha* 22, 27, 28, 57, 224–226  
*Thophini* 5, 22, 26  
*thophoides*, *Macrotristria*  
*tigris*, *Cicadetta* 18, 20, 75  
*tigris*, *Clinopsalta* 24, 78  
*tillyardi*, *Diemeniana* 95  
*tincta*, *Lembeja* 141  
*tomentosa*, *Tettigarcta* 21, 219, 220  
*toowoombae*, *Cicadetta* 75  
*toowoombae*, *Yoyetta* 24, 237  
*torrida*, *Cicada* 112, 115  
*torrida*, *Cicadetta* 15, 18, 19, 20, 75, 115  
*torrida*, *Gelidea* 24, 32, 38, 112, 114, 115  
*torrida*, *Melampsalta* 115  
*tortifer*, *Diceropyga* 90  
*Toxala* 19, 21, 24, 36, 78, 226–229  
*Trengganua* 84  
*triangulata*, *Diceropyga* 90  
*triodiae*, *Graminitigrina* 23, 117  
*tristigma*, *Cicada* 209  
*tristigma*, *Tamasa* 8, 9, 10, 12, 22, 209, 210, 211  
*tristrigata*, *Cicadetta* 75  
*tristrigata*, *Yoyetta* 24, 237  
*Tryella* 7, 23, 32, 46, 49, 229–231  
*Tryellina* 23, 26  
*typicus*, *Froggattoides* 18, 21, 24, 106, 107, 108  
*umbrimargo*, *Cicada* 137  
*umbrimargo*, *Kobonga* 12, 15, 18, 19, 20, 24, 137, 138  
*unicolor*, *Arenopsaltia* 53  
*unicolor*, *Parnquila* 22, 28, 174, 176  
*Urabunana* 5, 14, 19, 24, 38, 231–233  
*Uradolichos* 23, 34, 36, 96, 151, 170, 186, 233–235  
*varians*, *Birrima* 24, 60  
*varicolor*, *Baeturia* 59  
*varicolor*, *Gymnotympana* 25, 124, 125  
*venosa*, *Burbunga* 62, 176  
*venosa*, *Parnquila* 22, 174, 176  
*Venustria* 25, 30, 34, 126, 235–237  
*verlaani*, *Gymnotympana* 124  
*verna*, *Curvicicada* 229  
*verna*, *Toxala* 24, 36, 226, 227, 228, 229, 231  
*verna*, *Urabunana* 18, 21, 226, 229, 231  
*virens*, *Cyclochila* 22  
*virgulatus*, *Palapsalta* 23, 167, 178  
*virgulatus*, *Pauropsalta* 178  
*viridis*, *Cicadetta* 75  
*viridis*, *Glaucopsaltia* 25, 30, 115, 116  
*viridis*, *Gymnotympana* 124  
*viridis*, *Taurella* 24, 76, 211, 212  
*viridula*, *Guineapsaltia* 123  
*vitellinus*, *Palapsalta* 23, 167, 169, 178  
*vitellinus*, *Pauropsalta* 178  
*vitripennis*, *Chlorocysta* 25, 69, 70, 71  
*vittata*, *Macrotristria* 22, 144  
*vitticollis*, *Lembeja* 23, 139, 141  
*walkeri*, *Pauropsalta* 23, 176  
*warburtoni*, *Cicadetta* 74, 212  
*warburtoni*, *Melampsalta* 212  
*waterhousei*, *Cicadetta* 16, 18, 21, 75  
*waterhousei*, *Myopsalta* 24, 151, 152, 154  
*willsi*, *Tryella* 23, 229, 231  
*wollomombii*, *Myopsalta* 24, 151, 152, 231  
*wollomombii*, *Urabunana* 16, 18, 21, 231  
*woodlarkensis*, *Diceropyga* 90  
*worora*, *Macrotristria* 22, 144  
*Yanga* 84, 186  
*Yoyetta* 24, 34, 42, 43, 44, 45, 46, 206, 237–239





**PLATE 1.** Figs 1 *Kobonga umbrimargo*, male; 2 *Talcopsaltria olivei*, male; 3a *Clinopsalta adelaida*, female; 3b *Clinopsalta adelaida*, male; 4 *Gudanga boulayi*, male; 5 *Chrysocicada franceaustraliae*, male; 6 *Erempsalta hermannsburgensis*, male; 7 *Pictila occidentalis*, male; 8 *Heliopsalta polita*, male; 9a *Adelia borealis*, male; 9b *Adelia borealis*, female; 10a *Parnquila magna*, male; 10b *Parnquila magna*, female; 11 *Simona sancta*, male. Approximately 1.8x natural size.





**PLATE 2.** Figs 1 *Drymopsalta crepitum*, male; 2 *Crotopsalta plexis*, male; 3 *Caliginopsalta percola*, male; 4 *Gagatopsalta auranti*, male; 5 *Chelapsalta puer*, male; 6 *Neopunia graminis*, male; 7 *Graminitigrina bowensis*, male; 8 *Platypsalta dubia*, male; 9 *Pipilopsalta ceuthoviridis*, male; 10 *Noongara issoides*, male; 11a *Terepsalta infans*, male; 11b *Terepsalta infans*, female; 12a *Uradolichos longipennis*, male; 12b *Uradolichos longipennis*, female; 13a *Paradina leichardti*, male; 13b *Paradina leichardti*, female; 14 *Samaecicada subolivacea*, male; 15 *Dipsopsalta signata*, female; 16a *Clinata nodicosta*, male; 16b *Clinata nodicosta*, female; 17 *Plerapsalta multifascia*, male. Approximately twice natural size.